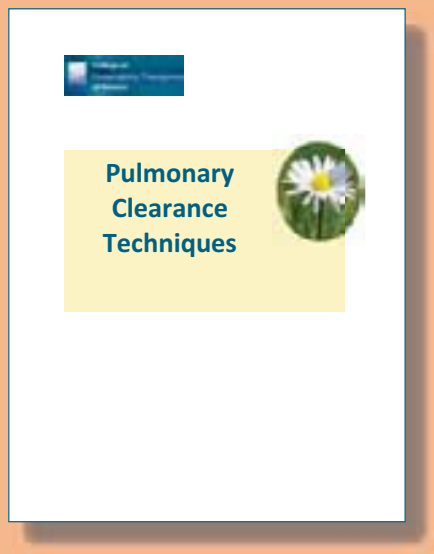
Pulmonary Clearance Techniques



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Pulmonary Clearance Techniques

Introduction

A strong cough is important so you can remove mucous from your lungs. If you have weak muscles you may not be able to cough out your mucous. Perhaps you cannot take a deep breath in. Perhaps you cannot breathe out with enough force to bring up the mucous. For a strong cough you need two things:

- ✓ To be able to completely fill your lungs and
- ✓ To be able to breathe out forcefully

There are ways to help you if your muscles are too weak. This section lists several methods and exercises to help you cough. If you use these exercises daily, you will be able move the mucous up from the airway into your throat or mouth, where it can be suctioned out.

Pulmonary Clearance Techniques may improve:

- ✓ The amount of air you can breathe into and out of the lungs
- ✓ Coughing and speaking
- ✓ The amount of oxygen getting to the body

Pulmonary Clearance Techniques may prevent:

- ✓ The air sacs from collapsing
- ✓ Lung infections

Common Techniques

- ✓ Breath Stacking
- ✓ Assisted Cough Technique
- ✓ Postive Expiratory Pressure (PEP)
- ✓ Cough Assist Device

All these techniques have one thing in common. They all need someone to help you.

Breath Stacking

Breath stacking is a breathing exercise that can help people who have breathing problems due to muscle weakness or poor chest movement.

You will need 2 manual resuscitation bags. You need one in case of emergencies where you need to use it to manually ventilate. The second one will be changed to become your Breath Stacking Bag. The bag used for breath stacking prevents the person from breathing out. The bag used for breath stacking should be clearly marked “Not for resuscitation”

Making a Breath Stacking Bag

- ✓ Manual resuscitator bag
- ✓ One-way valve
- ✓ Extension tube
- ✓ Either a mask or mouthpiece
- ✓ Nose clips

How is breath stacking done?

1. Have the person sit comfortably. They can lean back a bit, but they should not be slouching
2. Put on nose clips
3. Look at the person being bagged and try to squeeze the bag as the person breathes in
4. Have the person take a deep breath in
5. Have them place their lips around the mouthpiece or hold the mask on their face
6. Have the person breathe in the air as the bag is squeezed
7. Ask them to try to to keep breathing in more air, as the bag is squeezed a second time
8. They should fill their lungs as full as possible and feel a stretch across the front of their chest.
9. Have them hold the air in as long as possible before letting it go out. Use the air they are breathing out to cough.
10. Regular breath stacking is good to do even if it is not used with an assisted cough. You may find that breath stacking with an assisted cough is only needed once a day.

When breath stacking is done right, it should **not** result in:

- ✓ dizziness
- ✓ chest discomfort
- ✓ chest pain

IMPORTANT! If you encounter dizziness, chest discomfort or chest pain, stop the breath stacking exercise and rest.

How often should breath stacking be done?

Each time you do this exercise, do it 3 to 5 times. Breath stacking should not be done more than every ten minutes. Breath stacking should be done 3 to 5 times a day.

Assisted Cough Method

Having someone push on your abdomen (belly) just when you are trying to cough out is called the Assisted Cough method. If you are not able to have someone push on your abdomen, then they could push on your rib cage as you try to cough.

IMPORTANT! If you are sitting when this is done be sure that the chair will not tip over.

When should assisted cough be done?

Doing breath stacking and assisted cough method on a full stomach may cause you to vomit. To prevent this from happening do it:

- ✓ Before eating a meal
- ✓ 2 hrs after eating a meal
- ✓ Bedtime

Helpful Hints for Children

Children 2 to 6 years of age are often not able to take a deep breath in while you insert the mouthpiece or put the mask on. Ask them to pretend to blow out candles. This will help them to empty their lungs. Try to catch them on their next breath-in and say “take a deep breath, and another one, and another one”. Make eye contact with them the whole time. Then tell them to “cough” or “breathe out” when they exhale.

Cough Assist Device

The Cough Assist Device helps you get rid of mucous by trying to create a stronger cough. You hold a mask on the face and the machine delivers a slow pressure increase when you breathe in. Then it is followed by a rapid 'suction' effect. The slow breath-in followed by a quick breath out, creates a cough.

Figure 1: Cough Assist Device.
http://www.coughassist.com/default.asp
Reproduced with permission of Philips Respironetics

You can use either a mask or a mouthpiece with the Cough Assist Device. Small children and people with muscle weakness will have trouble keeping a seal on a mouthpiece, so will need to use a mask. When using a mask you will need a good seal. If using a mask, be sure you have good head and neck support, such as against a head rest on a wheelchair.

How do I give a Cough Assist Treatment?

1. You need two people to do the Assisted Cough technique
2. Have the patient sit comfortably with good head and neck support. They can be in bed, with their head partially supported.
3. Check that the suction unit is working and ready
4. Check that the pressure settings on the Cough Assist Device are what was ordered
   - Turn on the unit
   - Seal the mask with your hand while you operate the Cough Assist Device
   - Look at the pressure settings on both the IN and EX side

5. Make eye contact with the patient
   - Have the patient breathe out fully, then place the mask on their face just as they begin to breathe in -OR-
   - Have the patient breathe in and hold their breath as you place the mask on their face
6. Move the lever to IN side and hold while you call out clearly “IN, IN, IN”
7. Quickly switch lever to EX side and call out “Cough, Cough, Cough”
8. Remove mask right away
9. Suction, if needed

Young Children

Children need some time to become familiar with the sounds of the device. Let them play with the mask and push the buttons so they can hear the sounds. When they are comfortable with the sounds, let them try one assisted breath. Be patient. It will take some time for them to be comfortable with the exercise.

Other Pulmonary Clearance Techniques

Chest Physiotherapy

Chest physiotherapy is a physical technique of removing secretions with the use of clapping, percussion, vibrations and/or postural drainage. Talk to your healthcare professional to learn more about this technique.

Positive expiratory pressure devices (PEP)

The PEP device is a small hand-held device where you breathe out against a pressure.

Clinical References

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Resources

Ottawa Rehabilitation Center, www.rehab.on.ca

Notes

Education Checklists

Notes

Education Checklists

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Routine Tasks

What to do
and when to do it

Task	Daily	Weekly	Monthly
Stoma care	✓		
Trach care	✓		
Clean reusable inner cannula or replace disposable inner cannula	✓		
Clean speaking valves	✓		
Clean suction canister – warm soapy water	✓		
Change HME: if it is used all the time	✓		
Ventilator plugged in	✓		
Test ventilator alarms	✓		
Check ventilator settings	✓		
Test the ventilator circuit	✓		
Test the manual resuscitator bag, if used often	✓		
Make sterile distilled water	Every 2-3 days		
Test the manual resuscitator bag – if not used frequently		✓	
Clean suction canister in vinegar and water		✓	
Change HME: if being used only at night time		✓	
Wipe down suction machine		✓	
Change suction tubing		✓	
Clean and test manual resuscitation bag		✓	
Clean ventilator circuit		✓	
Clean puffer chamber		✓	
Clean humidifier		✓	
Unplug ventilator and wipe with a damp cloth		✓	
Check and order supplies		✓	
Change bacterial filter in breathing circuit			✓
Clean or replace inlet filters (see manual)			✓
Discharge and recharge ventilator internal battery			✓
Discharge and recharge the D/C External battery			✓
Change suction filter			Every 2nd month
Ventilator preventative maintenance by VEP or other equipment provider	As required by equipment provider		
Update the ventilator equipment pool with any changes	As changes occur		

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My Education Checklist and Learning Log

Introduction to Checklist

Below is a list of learning goals. It is important that all caregivers take part in learning how to care for someone who is ventilated. You will learn from many different healthcare professionals. This checklist is a guide to make sure that everything you need to know is covered. At any time, if you feel you need to redo something, or are unsure of something, just ask. Your healthcare professionals are eager to help you.

Individual's Name: _____

Learning Objectives

At the completion of the training, the participant will be able to…

Individual Care	Date	Initials	Caregiver Initials
1. Describe in general terms normal anatomy and physiology of the respiratory system: – How we breathe – Humidification – Upper airway anatomy and placement of a tracheostomy – What is different with a tracheostomy – Location and role of vocal cords – Explain why an individual with a trach tube might not be able to speak			
2. Describe how changing body position or eating a meal can affect breathing			
3. Demonstrate safe technique for: – Bathing – Feeding/Eating – Dressing			
4. Explain the importance of drinking water and using a humidifier to manage secretions			
5. Describe why heart rate or breathing rate may change with activity or illness			

6. Describe possible signs and symptoms of a chest infection and the steps to take if there is an infection			
7. Explain the importance of proper hand hygiene and how the use of gloves and a mask can prevent the spread of infection			
8. Explain the purpose of breath stacking			
9. Describe what equipment is needed for breathstacking			
10. Demonstrate how to do the breathstacking technique			
11. Describe the plan for follow-up care			
12. Explain the role of the family physician in the care of the individual			

Home Equipment	Date	Initials	Caregiver Initials
1. Identify the hazards and safety implications for someone with a trach due to a loss of the protective mechanisms of the upper airway			
2. Identify home environment hazards			
3. Determine if there are sufficient number of grounded plugs			

Inhaled Medication	Date	Initials	Caregiver Initials
1. Explain the function, dose and frequency of individual-specific Metered Dose Inhalers (MDI)/puffers			
2. Demonstrate/explain how to give an MDI/puffer with the ventilator			

Humidification System	Date	Initials	Caregiver Initials
1. Explain the importance of humidification			
2. Demonstrate when and how to use an heated moister exchanger (HME)			
3. Demonstrate how to use and clean a passover humidifier			

Tracheostomy Care	Date	Initials	Caregiver Initials
1. Define tracheostomy			
2. Explain why an individual might need a tracheostomy			
3. Name the parts of the tracheostomy tube			
4. Describe stoma care			
5. Describe how to prevent and manage skin breakdown			
6. Describe how to recognize and treat skin problems around stoma (e.g. granulomas) and neck			
7. Demonstrate how to clean the stoma and describe what equipment is needed			
8. Demonstrate correct inflation and deflation of a cuffed tracheostomy tube			
9. Explain the purpose of an inner cannula			
10. Demonstrate how to insert or remove an inner cannula			
11. Explain how a trach tube could become blocked and how to clear it			
12. Describe how to clean and take care of the trach equipment			
13. Demonstrate how to change the tracheostomy ties or holder			
14. Main role: Changes outer cannula, holds cannula in place until helper is finished securing the trach ties, assesses and maintains airway			

15. Helper role: removes ties, cleans neck and stoma, positions and holds person for tube change, suctions (tip or measured), secures ties when tube is change			
16. Describe and demonstrate the emergency replacement of the trach tube			
17. Trach Tube Change: ✓ Demonstrates Helper role on patient – Practice # 1 – Practice # 2 – Practice # 3 ✓ Demonstrates Main role on patient – Practice # 1 – Practice # 2 – Practice # 3 ✓ Demonstrates Solo trach change competently – Practice # 1 – Practice # 2 – Practice # 3			

Speaking Valves and Other Adjuncts	Date	Initials	Caregiver Initials
1. Describe how a speaking valve works and when to use it			
2. Describe how to clean and take care of the speaking valve			
3. Explain the importance of cuff deflation before using a speaking valve, if applicable			
4. Trach Mask			
5. Oxygen therapy			
6. Explain the need for a specialty trach tube and how to order one			

Oximeter	Date	Initials	Caregiver Initials
1. Explain what parameters the oximeter measures including the waveform, and perfusion index			
2. Demonstrate how to get a good saturation and heart rate reading			
3. Demonstrate correct application of probe			
4. Explain when to use oximeter; asleep and/or unattended			
5. Identify oximeter assessment abilities			
6. Demonstrate how to set correct alarm settings; low and high settings for saturation and Heart Rate (HR)			
7. Describe when and how often to change probe, every 4 hours and as needed (PRN)			
8. Systematic troubleshooting (refer to user guide)			
9. Explain the battery power requirements			
10. Explain the routine monitor maintenance			

Suctioning	Date	Initials	Caregiver Initials
1. Explain why an individual might need suctioning			
2. Identify the appropriate interventions for secretions that are: dry and thick, yellow or green, blood tinged			
3. Explain the purpose of suctioning			
4. Identify the characteristics of secretions: colour, consistency, amount, and odour and why it is important			
5. Demonstrate how to correctly set up the suction equipment			
6. Explain why it is important to use two gloves when suctioning			
7. Demonstrate clean suctioning technique including asking the individual for direction before and during suctioning			

8. Explain why suctioning should be done only when needed, trying to avoid over suctioning or frequent suctioning			
9. Explain what to do if blood is suctioned from the trachea, and explain what difference it might make if the individual takes blood thinners			
10. Explain how to troubleshoot the suction unit			
11. Describe correct disposal of dirty suction equipment including suction catheters and gloves			
12. Demonstrate how to: – Tip suction – Tube suction – Deep suction			
13. Demonstrate how to stock the portable suction bag for use outside the home			

Manual Ventilation	Date	Initials	Caregiver Initials
1. Demonstrate how to properly connect and disconnect an individual from a ventilator			
2. Demonstrate when and how to use the manual resuscitation bag			
3. Demonstrate how to test the manual resuscitation bag for proper functioning			
4. Demonstrate how to properly clean the manual resuscitation bag			
5. Demonstrate how to add oxygen when using the manual resuscitation bag			

Ventilator Care	Date	Initials	Caregiver Initials
1. Describe the purpose of a ventilator and when an individual might need one			
2. Demonstrate what needs the check-out procedure when starting the ventilator at the bedside: high and low pressure testing			
3. Demonstrate what needs to be turned on and checked when starting the ventilator on the wheelchair			
4. Demonstrate how to change the water in the humidifier, and describe what kind of water is used in the humidifier			
5. Explain what needs to be plugged in when the wheelchair ventilator is not in use			
6. Demonstrate how and when to make ventilator setting changes, including oxygen			
7. Demonstrate how to check the ventilator high and low pressure alarms			
8. Describe the kind of situations that make the low-pressure alarm sound and what to do for the individual			
9. Describe the kind of situations that make the high-pressure alarm sound and what to do for the individual			
10. Describe the kind of situations that make the power switch over alarm sound and what to do for the individual			
11. Describe the kind of situations that make the ventilator inoperative alarm sound and what to do for the individual			
12. Describe all ventilator alarms including high and low pressure alarms			
13. Describe what to do when there is a ventilator IN OP alarm			
14. Demonstrate how to assemble and disassemble the ventilator circuit			

15. Demonstrate changing the ventilator circuit and checking the ventilator after changing the circuit			
16. Describe how to use a PEEP valve (if applicable)			
17. Demonstrate how to assemble and disassemble the PEEP valve (if applicable)			
18. Demonstrate how to clean the ventilator circuit			
19. Describe how and when to clean the ventilator circuit and change the filters			
20. Demonstrate how to check the external and internal battery			
21. Discuss how long a battery should last			
22. Discuss how often to check and discharge the battery			
23. Demonstrate how to charge and discharge the battery			

Emergency Management	Date	Initials	Caregiver Initials
1. Describe the emergency plan, i.e. when to call 911			
2. Describe the role of the home care company in an emergency			
3. Describe the role of the acute care hospital in an emergency or power failure situation			
4. Describe the role of Hydro and the Fire Department in an emergency			
5. Explain the emergency preparedness plan, including the procedure during a power failure			
6. Explain what to do if the individual has an obstructed air passage, such as how to clear the airway			
7. Explain how to identify and manage someone in respiratory distress			
8. Describe/demonstrate correct actions for each of the following situations: – Accidental decannulation – Mucous Plug – Trauma to stoma area			
9. Identify and indicate how to contact local emergency resources 10. Identify what information needs to be conveyed to emergency personnel 11. Ensure family is provided with emergency contact list			
12. Caregivers are trained in CPR			
13. Demonstrate manual ventilation of a tracheostomy			
14. Demonstrate how to ventilate should the trach come out and you can't replace it			

Funding and Equipment Supply	Date	Initials	Caregiver Initials
1. Explain the role of Assistive Devices Program (ADP) in funding the equipment and supplies			
2. Explain the role of the Ventilator Equipment Pool (VEP) and how to contact them			
3. List the equipment provided by the VEP			
4. List equipment not provided by the VEP			
5. Explain the role of the home care company and how and when to contact them			
6. List the supplies that come from the home care company, how to place an order and explain funding			
7. List the supplies not covered by ADP that the individual is responsible for			
8. Describe how to safely store equipment			
9. Describe when to discard equipment (please refer to guidelines in the *Ventilation & Tracheostomy Care* section)			

Healthcare Provider Name/Designation	Signature	Initials

Best Time for Education Sessions

Check off morning (M), afternoon (A) or evening (E) in the chart below for the best time for our education sessions.

Caregiver	Relationship to Patient	Su	Mo	Tu	We	Th	Fr	Sa

Additional Comments

I understand that, although I may complete this education checklist, I am not being certified to do any of the acts described. Any actions that I take following this training will be done under the direction and responsibility of the patient or their authorized agent.

Caregiver Signature: _____ Date: _____

Facility Name: _____

Address: _____

Instructor Signature: _____ Date: _____

Facility Name: _____

Address: _____

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Oximeter Teaching Checklist

This is a checklist for the healthcare professional to use when reviewing the oximetry equipment with the caregiver. Verify receipt of the equipment, probes, the reference manual and user guide.

1. **Ensure all probes and cables are working by testing them on either yourself or patient. Ensure caregiver performs the same test on the child**

2. **Review and explain parameters**:
   - ❑ Spo2
   - ❑ Heart rate
   - ❑ Waveform
   - ❑ Perfusion Index

3. **Review and explain alarms (must be ordered by physician):**
   - ❑ Low Saturation
   - ❑ High Saturation (if a patient is not on oxygen this can be turned off as ordered by physician)
   - ❑ Low Heart Rate
   - ❑ High Heart Rate
   - ❑ Explain that adjusting alarms must have a physician's order
   - ❑ Demonstrate how to adjust alarms (in case physician orders it to be made at home)

4. **Review and explain:**
   - ❑ Power indicator light
   - ❑ Battery indicator (four shaded segments = fully charged)
   - ❑ Heart rate volume
   - ❑ Alarm volume
   - ❑ Backlight
   - ❑ Lock function
   - ❑ Alarm silence button – one for two min silence; three quick will silence indefinitely – press once to reset to normal function

5. **Review battery power:**
   - ❑ Needs 3.5 hours to completely charge internal battery
   - ❑ Battery life – 24 hours if completely charged (if backlight is on the internal battery lasts 12 hours)

6. **Troubleshooting:**
   - ❑ Review the troubleshooting guide in the technical reference manual page 3-1

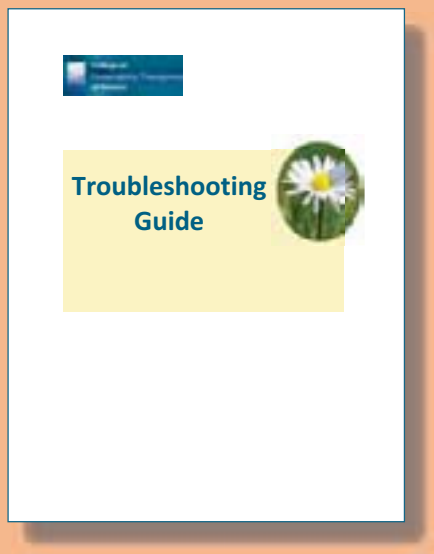
7. **Contact information to tell family/ caregiver:**
   - ❑ Contact Ventilator Equipment Pool (VEP)
   - ❑ Explain to the caregiver when equipment is no longer needed and physician has discontinued use, caregiver to contact VEP to return

_____ _____

Caregiver Signature and Date **RRT Signature and Date**

Notes

Troubleshooting



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Troubleshooting Guide

Problems and Solutions

When caring for patients on long term ventilation, you need to be aware of problems that may arise. The problems may be related to what is happening with the patient or what is happening with the ventilator.

Problems Related to the Patient

Whenever there is a problem, the first thing you need to do is look at the patient to see if they are having any breathing problems. Patients will try to tell you if they are having trouble breathing, are in pain, or need something. Every person is different, but common ways of getting your attention include:

- ✓ Clicking their tongues
- ✓ Making unusual sounds
- ✓ Triggering an emergency bell or a ventilator alarm

If the patient is having trouble breathing they may look:

- ✓ Short of breath
- ✓ Pale, dusky or blue
- ✓ Scared or frightened

Consider using a baby monitor alarm, so others can hear if there is a problem.

IMPORTANT! If the patient cannot speak or communicate, then they are not getting any air. If this happens, manually ventilate using the resuscitation bag. A patient with a speaking valve who cannot talk usually means they are not getting any air.

What do I do if the patient is in distress?

1. Try to find out what the problem is by asking the patient “What is the problem?” or “Are you getting enough air?” or “Do you need to be suctioned?”
2. Manually ventilate using a resuscitation bag
3. Use oxygen with the resuscitation bag, if needed

4. If the patient has nodded yes to “Do you need to be suctioned?” then suction them immediately
5. Call out for help to anyone who can hear you, such as a family member. Phone 911 or your regional emergency number for an ambulance
6. Keep on manually ventilating the patient until help arrives
7. Stay with the patient. Tell the patient what is happening, and that help is on the way
8. Once emergency support has arrived explain the problem to the attendants

The following **table** lists problems and some steps to take to solve them. If you at any time do not feel that you are able to correct the problem, do not wait to call for help.

Problem	What to do
– Blocked Airway – Choking on food – Mucous in the airway	✓ Suction to remove mucous or food ✓ Manually ventilate using the resuscitation bag ✓ If there is an inner cannula, change it
Patient is “not getting enough air”	✓ Manually ventilate using the resuscitation bag ✓ Suction to remove anything that may be blocking the airway ✓ Tighten all ventilator tubing connections ✓ Check that there is no leak in the system ✓ Make sure the humidifier hose is connected ✓ Make sure the ventilator settings are set correctly ✓ Check to see if there is a trach tube cuff leak ✓ If oxygen is being used, check that the oxygen supply is set up correctly ✓ If patient is short of breath right after activity, allow them to settle or rest a little to see if there is improvement ✓ The patient may need their bronchodilator (puffer); if it is part of the care plan, then give the dose now ✓ If you have an oximeter, check the reading ✓ If there is a cuffed trach tube, make sure the cuff is properly inflated

Problem	What to do
Problem with the Trach Tube	✓ Make sure the ventilator tubing is not pulling on the trach tube ✓ Reposition the patient so the tube is not being pulled on ✓ Reposition the head and neck ✓ If on the ventilator, and you hear air coming from around the trach, you may have a trach tube cuff leak ✓ Check that the inner cannula is not blocked and is locked in place ✓ Check that the trach ties are tied securely, but not too tight ✓ May need a trach tube change
Possible infection: – Stoma is red, swollen or painful to touch – Mucous is yellow or green – There is more mucous – You need to suction more often – Needs more puffer medicine – Has a fever or chills – Is not feeling well and is really tired – Oximeter reading, if you have one, is low	✓ If you have an action plan that the doctor has given you, follow that ✓ Call the doctor or healthcare professional right away
The patient is very anxious	✓ Instill 2-5 mls of normal saline into trach and apply manual resuscitator or ventilator for a few breaths ✓ Use *Breath Stacking and Cough Assist* techniques to move any mucous up the airway ✓ Try to remain calm and tell them what you are doing to solve the problem ✓ Have patient do relaxation exercises ✓ If necessary, give medication as ordered

Problem	What to do
There is a lot of mucous and it is difficult to suction it all out	✓ Suction 1. Lubricate the suction catheter with water and try suctioning again 2. Use manual resuscitation bag to deliver 3-5 breaths 3. Change the inner cannula, if there is one 4. Suction 5. Repeat steps 1-4, if needed ✓ Use *Pulmonary Clearance Techniques* – such as Breath Stacking. This will help move the mucous up so it can be suctioned out ✓ Moving often will help a patient cough up their mucous. You can turn the patient every 1-2 hours or have them sit in a chair several times a day ✓ If you have learned how, change the trach tube ✓ Call 911 if airway is still blocked
The trach tube has fallen out and the patient is not having any trouble breathing	✓ Try to put the trach tube back in. Only try this once. If this does not work, get a new trach tube to insert 1. Completely deflate the cuff of the new trach tube 2. Lubricate the trach tube with water soluble lubricant 3. Insert obturator into the new trach tube 4. Slide new trach tube into stoma, but do not force 5. **Remove the obturator** 6. Insert the inner cannula, if there is one 7. Reinflate cuff, if there is one 8. Try to ventilate with a manual resuscitation bag 9. Check that the chest is rising and falling with each breath 10. Place patient back on the ventilator 11. Check patient to make sure they are okay ✓ If you are **not** able to **re-insert the trach tube**: 1. Use a manual resuscitation bag with mask and ventilate the patient 2. **CALL 911** 3. Contact your doctor and your respiratory therapist

Problem	What to do
The patient is in pain	✓ Determine the type and location of the pain. For example; is the pain with coughing, swallowing or only on breathing in? ✓ Try to reposition the patient ✓ Give pain medicine, if ordered ✓ If there is chest tightness, then give inhaled medicine (puffer), if ordered
The trach tube has fallen out and the patient is having trouble breathing	✓ Attempt to re-insert trach tube **ONCE** (see above) ✓ **CALL 911** ✓ **If you cannot reinsert a trach tube of same size: try inserting either a tube that is one size smaller or a cuffless tube** ✓ Put a mask on the manual resuscitator bag ✓ If the **patient needs oxygen**: remove oxygen supply from ventilator and connect to the manual resuscitation bag ✓ Place the mask over the patient's mouth and nose and give manual breaths. Have a second person cover the stoma while you manually ventilate

IMPORTANT! Always use a manual resuscitation bag to give breaths while you are troubleshooting.

Problems and Solutions – The Ventilator

IMPORTANT! When a ventilator alarms, always look at the patient first, not the ventilator. Look to make sure that the chest is moving up and down. Make eye contact with the patient and ask "Are you okay?"

Ventilators will alert you to a safety problem with a visual or an audible alarm. Some situations will trigger a visual or an audible alarm. Serious situations will trigger both audible and visual alarms together. You need to learn what the alarms mean on your ventilator.

Whatever the warning signal is, follow these steps:

1. Never leave the patient alone until the problem has been fixed
2. Use a manual resuscitation bag to ventilate the patient while you are trying to fix a ventilator problem
3. Find out which alarm went off
4. Correct any problems, if you find any
5. Replace any broken equipment
6. Change the ventilator circuit, if needed. You should always have a spare ventilator circuit set up, ready for use
7. Any equipment that failed is called 'defective'. Do not use defective equipment. If your ventilator is defective, manually ventilate the patient. If there is no other ventilator available then call for an ambulance to take the patient to the nearest hospital
8. Once the patient is stable and taken care of, call the VEP to report the problem. The telephone number for VEP is 1-800-633-8977. A respiratory therapist is on hand 24 hours a day to help with ventilator issues and problems. Follow the prompts on the message for service after business hours
9. For other replacement disposable supplies, contact the home care company

The following **table** lists specific problems and what you can do to solve them. Please see manufacturer's instructions for a complete list of alarms for your ventilator.

Alarm	Possible cause	What to do
High Pressure	✓ Mucous plugs or mucous ✓ Coughing, swallowing or hiccupping ✓ Bronchospasm ✓ Changes in patient's breathing pattern. Patient is not responding to medicine or suctioning ✓ Alarm set incorrectly	✓ Suction to remove mucous ✓ If coughing, may need puffer or suctioning ✓ Give inhaled medicine, if ordered ✓ Contact the appropriate healthcare provider ✓ Change alarm to proper setting
Low Pressure/ Apnea	✓ Leaks in the ventilator circuit ✓ Water in pressure line ✓ Patient is disconnected from ventilator ✓ Leaks around trach or trach tube cuff ✓ Alarm set incorrectly ✓ Dirty inlet filter	✓ Look and feel for any leaks: exhalation valve, humidifier, pressure line, and tubing for leaks ✓ Drain water ✓ Reconnect patient to ventilator ✓ Reposition patient and, or the trach tube. Try to deflate/ reinflate the cuff ✓ Reset alarm to proper setting ✓ Replace filter
Setting	✓ Settings are incorrect ✓ Ventilator malfunction	✓ Reset settings ✓ Manually ventilate patient and call the equipment provider
Power Switch Over	✓ Power source has changed from AC to internal or external power source ✓ Power source has changed from external to internal	✓ Ensure ventilator is plugged in and there is power ✓ If switching to or from an external battery, then press the **reset button to cancel the audible and visual alarm**
Low Power	✓ Internal battery is discharged	✓ Plug in and operate ventilator on AC power for at least three hours. If no power is available then manually ventilate

Notes

Emergency Contacts & Planning

Notes

Emergency Contacts & Planning

College of Respiratory Therapists of Ontario

Emergency Contacts and Planning

All About You

Your Contact Information

First Name: _____

Middle Name: _____

Last (Family) Name: _____

Street Address: _____

City: _____ Postal Code: _____

Home Phone: _____ Cell Phone: _____

Fax: _____ Email: _____

Date of Birth: _____

Allergies: _____

Your Ventilator Settings

These settings have been determined by your doctor and healthcare professionals team. Do not change the settings without first talking with your doctor and healthcare professionals.

Make: _____ Model: _____

Mode: _____

Volume: _____ Breath Rate: _____

Low Minute Volume: _____Pressure: _____

IMPORTANT! You need to have a complete list of your ventilator settings, even those settings that do not appear on the front panel of the ventilator.

If you use a speaking valve, first deflate the cuff. Then change the ventilator settings to:

Volume: _____ Breath Rate: _____

Inspiratory Time (I:E ratio): _____

Breath Effort (sensitivity): _____

Low Alarm: _____ High Alarm: _____

Keep track of ventilator setting changes

Ventilator Setting Change	Reason for Change	Date Changed

Your Trach Tube

Make: _____ Model: _____

Type/Serial #: _____ Size: _____

Ordering information: _____

Keep track of when the trach tube was changed

Date of Change	Tube Make/Model	Tube Size	Tube Type	Location	Who changed it?

Keep track of medicine taken

Drug Name	What it does	How much or how many	When to take

Special Instructions

Your Personal Support Network

Your personal support networks are people who know about your healthcare needs and can be called upon to help you in an emergency.

Family Doctor

Name: _____

Phone: _____

Other Doctor Specialty: _____

Name: _____

Phone: _____

Home Healthcare Professional Specialty: _____

Name: _____

Phone: _____

Home Healthcare Professional Specialty: _____

Name: _____

Phone: _____

Equipment Supplier

Name: _____

Phone: _____

Family Friend

Name: _____

Phone: _____

Family Friend

Name: _____

Phone: _____

Other Contact Specialty: Ventilator Equipment Pool

Name: _____

Phone: _____

Other Contact Specialty: Home Care Company

Name: _____

Phone: _____

Your Personal Emergency Plan

Developing a personal plan can help you to cope during an emergency. Completing the information below will help you to develop a good plan.

What to do if there is a power failure?

Use your external D/C battery, given to you by the Ventilator Equipment Pool (VEP), for emergency use. A full charged battery should last 5-12 hours.

- ✓ Go somewhere where there is power. Somewhere close to your home. This could be a hospital, a hotel, a fire or ambulance hall. These places usually have power even during a power outage
- ✓ Call family or friends to see if their power is out. If they still have power, you could go there. Make sure there is at least one person on your contact list that lives close by and understands your needs
- ✓ Plan on how you might escape from your home. Getting out of your home quickly and safely can be difficult, so you need a plan. For example, if you live in a high rise apartment, it may not have adequate back up power for a long power outage. It may not be easy to get out of the building when the elevators are not working. So you need to have a plan

You need two external D/C batteries, if you want to be mobile with your ventilator. One battery to use when you are mobile, and the other battery in case of a power failure. The backup battery from the VEP is not to be used with your wheelchair. You need to buy another D/C external battery if you want to use your ventilator while you are mobile.

If you are having trouble paying for a second battery, consider going to Assistance for Children with Sever Disabilities (ACSD) or Ontario Disability Support Program (ODSP), insurance, or various service clubs to ask for help. Sometimes they can help with funding.

Consider where you could go if there was a prolonged power outage: List friends, family, hospital or fire station address here.

Family/Friend: _____

Street Address: _____

City: _____ Postal Code: _____

Contact Person: _____ Home Phone: _____

Cell Phone: _____

Out-of-Town Family/Friend: _____

Street Address: _____

City: _____ Postal Code: _____

Contact Person: _____ Home Phone: _____

Cell Phone: _____

Long-term Emergency Refuge

If the power outage is long term you will have to leave your home and stay somewhere else for a while. Make plans on where you will go if this happens.

Street Address: _____

City: _____ Postal Code: _____

Contact Person: _____ Home Phone: _____

Cell Phone: _____

How will I get there?

Have a transportation plan ready in case you need to leave home quickly.

Contact Person: _____ Home Phone: _____

Cell Phone: _____

Travel Bag Checklist

In an emergency you will have to leave your home quickly. Have a travel bag packed with everything you would need to take with you in an emergency. The contents of your travel bag should include:

- ❑ Spare trach tubes: current trach tube size and another one that is one size smaller
- ❑ Ventilator settings
- ❑ Spare ventilator circuit and HMEs
- ❑ Your Contact List
  - Healthcare team names and phone numbers
  - Personal support network names and phone numbers
  - VEP phone number
  - Equipment supplier name and phone number
  - Oxygen supplier name and phone number
- ❑ List of medicines and inhalers (puffers)
- ❑ Resuscitation bag and mask
- ❑ Portable suction unit and supplies
- ❑ D/C Battery

Fire Precautions

Fire Extinguishers

- ✓ Have two fire extinguishers in the home
- ✓ Your fire extinguishers need to be checked once a year

Smoke Detectors

- ✓ Have one smoke detector on every level in your home
- ✓ Change the batteries in your smoke detectors twice a year. Many people change their smoke alarm batteries twice a year; when they change their clocks in the spring and the fall. Write the date you changed the batteries, on the smoke detector
- ✓ Post a "No Smoking/Flame" sign, if oxygen is in use

Emergency Supplies

An emergency situation may occur that requires you to stay in your home for a long period of time. So it is wise to have some emergency supplies. Have enough supplies for a week. According to the "Emergency Preparedness Guide for People with Disabilities/Special Needs" from Emergency Management Ontario. Here is what they suggest:

- ❑ Respiratory travel bag
- ❑ Enough medications
- ❑ MedicAlert® bracelet or identification
- ❑ Bottled water
- ❑ Food (non-perishable)
- ❑ Manual can opener
- ❑ Flashlight(s) & batteries
- ❑ Battery operated radio & batteries or crank radio
- ❑ Spare batteries
- ❑ Candles and matches/lighter
- ❑ Important papers (identification)
- ❑ Clothing and footwear
- ❑ Blankets or sleeping bags
- ❑ Toilet paper and other personal items
- ❑ Telephone that can work during a power disruption
- ❑ Extra car keys and cash

- ❑ Whistle (to attract attention, if needed)
- ❑ Playing cards
- ❑ First-aid kit
- ❑ Backpack or duffle bag

This Guide may found at the web site www.emergencymanagementontario.ca. Make sure that your supplies do not become too old to use. For example, keep your medicine up to date. Buy bottled water and food with a long expiry date. You should also check your flashlight(s) and replace the batteries from time to time.

Notes

College of Respiratory Therapists of Ontario

Emergency Preparedness Guide

Acknowledgement of Source

The following document, titled "**Emergency Preparedness Guide for People with Disabilities/Special Needs**" has been provided by **Emergency Management Ontario**.

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Ontario

Emergency Preparedness Guide

for People with Disabilities / Special Needs

www.ontario.ca/emo

Acknowledgements

This Emergency Preparedness Guide for People with Disabilities and/or Special Needs was prepared by the Government of Ontario's Emergency Management Ontario in partnership with the Accessibility Directorate of Ontario.

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- Canadian Diabetes Association
- Canadian MedicAlert® Foundation
- Canadian Paraplegic Association (Ontario)
- Canadian Red Cross
- Centre for Independent Living in Toronto (CILT) Inc.
- CNIB
- Foreign Affairs and International Trade Canada
- Learning Disabilities Association of Ontario
- Ministry of Community and Social Services Emergency Management Unit
- Ministry of Government Services
- Multiple Sclerosis Society of Canada, Toronto Chapter and Ontario Division
- National (USA) Organization on Disability - Headquarters
- Office of the Fire Marshal – Ontario Head Office
- Ontario March of Dimes (Provincial Office)
- Ontario Seniors' Secretariat
- Ontario SPCA (Ontario Society for the Prevention of Cruelty to Animals)
- SOS Emergency Response Technologies
- St. Demetrius Development Corporation
- The Canadian Hearing Society
- Toronto Rehabilitation Institute

Special appreciation is also extended to all the people that volunteered their time to pose for the pictures throughout this guide.

Emergency Management Ontario
Ministry of Community Safety
and Correctional Services
www.ontario.ca/emo

Accessibility Directorate of Ontario
Ministry of Community
and Social Services
www.mcss.gov.on.ca

Since not every emergency situation is similar or predictable, every person should rely on and use their best judgement when offering assistance to others in an emergency, without putting their own or other people's safety at risk.

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Introduction

Emergencies can occur suddenly and without any advance warning. Although Ontario has effective emergency management legislation and programs, individuals and families play a vital role in preparing for times of crisis when emergency services and other government resources may be strained. It is important that individuals and families prepare to be self-reliant for at least three (3) days immediately after or during an emergency. This guide provides special emergency preparedness considerations and advice for the estimated 1.5 million Ontarians with disabilities and/or special needs, including seniors with special needs.

Prepare Now

Emergency preparedness includes developing and practising a family emergency response plan and the preparation of an emergency survival kit.

For those living with a physical, visual, auditory and/or other non-visible disability, emergency preparedness should also involve incorporating special accommodations into their family emergency response plan. To best prepare for an emergency according to one's special needs, please refer to the appropriate category in this guide for a list of suggested emergency survival kit items and contingency planning considerations.

For more information on emergency management arrangements in your area contact your municipal Emergency Management Coordinator through your local government office.

Using this Guide

This guide covers topics relevant to the emergency preparedness needs of people with visible and/or non-visible disabilities and seniors with special needs.

- Disabilities/special needs are identified as separate categories according to colour and a symbol shown on the top right hand corner of each page.
- Each category provides information on how individuals should prepare for an emergency given their special needs, how the public can best assist a person with a disability and additional suggested survival kit items.
- The last page is an additional contact information resource for the reader.
- Copies of this guide are available in both English and French, and in alternative formats upon request. Please contact:

Emergency Management Ontario
General Tel: 416-314-3723
Toll-free Phone: 1-877-314-3723

Accessibility Directorate of Ontario
General Tel: 416-326-0207
Toll-free Phone: 1-888-520-5828
TTY: 416-326-0148
Toll-free TTY: 1-888-335-6611

Emergency Survival Kit Checklist

This Emergency Survival Kit checklist outlines the basic items every individual should keep in an easy-to-reach place to help them be self-reliant for at least three (3) days immediately after or during an emergency. Since emergency supply requirements vary for individuals with different disabilities, please refer to the appropriate category in this guide for additional suggested survival kit items.

Prepare Now,
Emergency Survival Checklist
Learn How...

- ❍ Flashlight and batteries
- ❍ Radio and batteries or crank radio
- ❍ Spare batteries (for radio, flashlight, assistive devices, etc.)
- ❍ First-aid kit
- ❍ Telephone that can work during a power disruption
- ❍ Candles and matches/lighter
- ❍ Extra car keys and cash
- ❍ Important papers (identification)
- ❍ Non-perishable food and bottled water
- ❍ Manual can opener
- ❍ Clothing and footwear
- ❍ Blankets or sleeping bags
- ❍ Toilet paper and other personal items
- ❍ Medication
- ❍ MedicAlert® bracelet or identification
- ❍ Backpack/duffle bag
- ❍ Whistle (to attract attention, if needed)
- ❍ Playing cards

Service Animal Emergency Kit Checklist

This Service Animal Emergency Kit checklist outlines the basic items every person with a service animal should have prepared in advance to keep their service animals comfortable during the stress of an emergency situation. It is advisable to keep all items in a transportable bag that is easy to access should evacuating the home become necessary. Also, remember to check the kit twice a year (an easy way to remember is to do it when you check your smoke alarms bi-annually) to ensure freshness of food, water and medication, and to restock any supplies you may have "borrowed" from the kit.

Service Animal Emergency Kit Checklist

- ❍ Minimum 3-day supply of bottled water and pet food
- ❍ Portable water and food bowls
- ❍ Paper towels and can opener
- ❍ Medications with a list identifying reason (e.g., medical condition), dosage, frequency and contact information of prescribing veterinarian
- ❍ Medical records including vaccinations
- ❍ Leash/harness
- ❍ Muzzle (if required)
- ❍ Blanket and favourite toy
- ❍ Plastic bags
- ❍ Up-to-date ID tag with your phone number and the name/phone number of your veterinarian (microchipping is also recommended)
- ❍ Current photo of your service animal in case they get lost or separated from you
- ❍ Copy of licence (if required)

Pet Owners:

While service animals are accepted at shelters in an emergency, family pets are not. Hence, it is advisable for pet owners to prepare a similar emergency kit for each family pet according to the needs of each different animal (e.g., cat, rabbit, bird, etc.). In the case of cats, include a cat carrier, little pan, litter, scooper and plastic bags. It is also recommended for pet owners to have prior arrangements made with family or friends to take care of their animal, should evacuating the home be necessary during an emergency. For additional information on pets and emergencies, please visit the Emergency Management Ontario website at www.ontario.ca/emo.

Important Considerations

Remember…

- The emergency survival kit items listed in this guide are only a suggestion and may or may not apply to every emergency situation and/or a person's special needs. Therefore you should decide which essential items to include for yourself and your family members.
- During an emergency you may have no electrical power.
- During an emergency you may need to go to an emergency evacuation shelter. It is recommended that you and your family have a designated contact person that resides outside of your immediate community. This way, in the event of an evacuation, family members can easily notify each other by calling their designated contact person.
- Pack and store all emergency survival items (including medications, medical supplies and/or assistive devices) in an easy-to-access and easy-to-transport container should you need to evacuate.
- Select a network of individuals at work and at home that will be able to assist you during an emergency. (Make sure you inform your network of where you keep your emergency survival kit.)
- Prepare a list of any food or drug allergies you might have and all the medications you are taking. You may want to provide this list to your designated network and also keep a copy in your emergency survival kit, on your person, at home, your workplace and in your car (if applicable).
- On your list of medications, specify the reason for each medicine that you are taking (e.g., medical condition being treated) including the generic name, dosage, frequency, and the name and contact information of the prescribing physician.
- If you have children with a disability or special needs, prepare a similar list for each of your children and provide it to their caregiver, school, emergency contact members, etc.
- If you have an allergy, chronic medical condition, or special medical need you may want to consider owning and wearing a MedicAlert® bracelet or identification as part of your emergency preparedness plan.
  For more information visit: www.medicalert.ca.

Important Considerations

Remember…

- Regularly check expiration dates on all medications, bottled water, and canned/packaged food in your emergency survival kit. It is best to replace food and bottled water at least once a year.
- Prepare a contact information list of all your emergency contact persons and provide a copy to your designated network at work and/or home. Also keep a copy in your survival kit, on your person, at home, at your workplace and in your car (if applicable).
- Provide written instructions for your network on how best to assist you and your service animal (if applicable) during an emergency.
- Label all of your special needs equipment and attach laminated instruction cards on how to use, retrieve and/or move each assistive device during an emergency.
- Since your medications, assistive devices, etc. may change over time, it is advisable for you to regularly assess your needs and incorporate any changes to your emergency survival kit supplies and your family emergency plan.
- If your personal needs require regular attendant care and/or life sustaining apparatus, arrange with your network to check on you immediately if an emergency occurs or if local officials issue an evacuation order.
- Carry a personal alarm that emits a loud noise to draw attention to your whereabouts.
- If you rely on any life sustaining equipment/apparatus, develop an emergency back-up plan that will ensure the equipment/apparatus works in the event of a power outage.
- Install working smoke alarms on every floor of your home and outside all sleeping areas.
- Test smoke alarms on a monthly basis by pushing the test button. Replace smoke alarm batteries every six months and whenever the low-battery warning sounds.
- Develop and practise a home fire escape plan or refer to your building's fire safety plan so that everyone in your home knows what to do in the event of a fire.
- Practise your emergency plan with your network at least twice a year.
- If during an emergency your support network cannot assist you for whatever reason, ask other individuals around you to help you. Remember to inform them of your special needs and how they can best offer any assistance to you.

Important Considerations

Tips on Helping a Person with a Disability

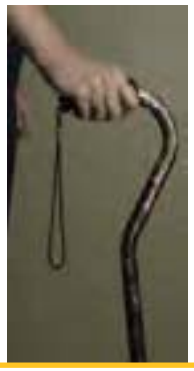
- "Ask First" if the person needs or wants your help – do not just assume that they do.
- Allow the person to identify how best to assist them.
- Do not touch the person, their service animal and/or their assistive device/equipment without their permission.
- Follow instructions posted on special needs equipment and/or assistive device during an emergency.
- Avoid attempts to lift, support or assist in moving someone unless you are familiar with safe techniques.
- Never administer any food or liquids to an unconscious or unresponsive person.
- Be aware that some people who have disabilities may request that you use latex-free gloves to reduce spread of viral infection to them.
- Ask the person with special needs if areas of their body have reduced sensation and if they need you to check those areas for injuries after a disaster.

Mobility

Mobility limitations may make it difficult for a person to use stairs or to move quickly over long distances. These can include reliance on mobility devices such as a wheelchair, scooter, walker, crutches or a walking cane. In addition, people with a heart condition or various respiratory difficulties can experience certain levels of mobility limitations.

Your Emergency Plan:

- Ask your network to practise moving your special needs equipment during your emergency practice plan. This will help your network become more comfortable handling or using your special needs equipment during an emergency.
- If you use a wheelchair or scooter, request that an emergency evacuation chair be stored near a stairwell on the same floor that you work or live on, so that your network can readily use it to help you safely evacuate the building.
- In your instruction list for your network, identify areas of your body that have reduced sensation so these areas can be checked for injuries after an emergency, if you cannot check them yourself.
- Check with your local municipal office to find out if emergency evacuation shelters in your area are wheelchair accessible.



Dos & Don'ts

Assisting People with Disabilities

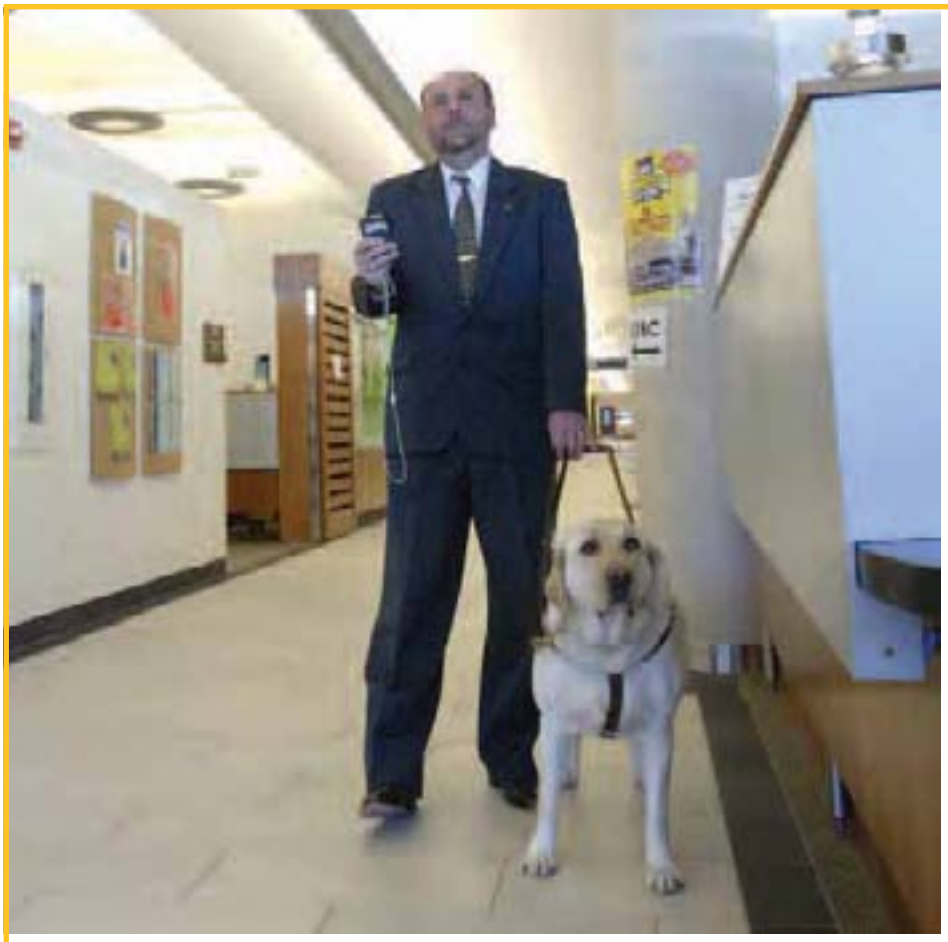
- ✔ Use latex-free gloves when providing personal care whenever possible. (People with spinal cord injury have a greater risk of developing an infectious disease during an emergency. Gloves help control secondary medical conditions that can easily arise if personal care is disrupted during an emergency.)
- ✔ Ensure that the person's wheelchair goes with the person.
- ✘ Do not push or pull a person's wheelchair without their permission.

Additional Items

Emergency Survival Kit

- Tire patch kit.
- Can of seal-in-air product (to repair flat tires on your wheelchair or scooter).
- Supply of inner tubes.
- Pair of heavy gloves (to protect your hands while wheeling or making way over glass or other sharp debris).
- Latex-free gloves (for anyone providing personal care to you).
- Spare deep-cycle battery for motorized wheelchair or scooter.
- A lightweight manual wheelchair for backup to a motorized wheelchair (if feasible).
- Spare catheters (if applicable).
- An emergency back-up plan that will ensure any life sustaining equipment/apparatus is operable in the event of a power outage.
- Any other contingency supplies unique to your special needs.

Vision



Vision loss can include a broad range of conditions ranging from complete blindness to partial or low vision that cannot be corrected with lenses or surgery. A person's ability to read signs or move through unfamiliar environments during an emergency may be challenged, creating a feeling of being lost and/or being dependent on others for guidance.

Your Emergency Plan:

- Have a long cane available to readily manoeuvre around debris on the floor or furniture that may have shifted after an emergency.
- Mark all emergency supplies in advance with fluorescent tape, large print or in braille.
- Mark gas, water and electric shutoff valves in advance with fluorescent tape, large print or in braille.
- Familiarize yourself in advance with all escape routes and locations of emergency doors/exits on each floor of any building where you work, live and/or visit.

Additional Items
Emergency Survival Kit

- Extra white cane, preferably a cane that is longer in length.
- Talking or braille clock.
- Large-print timepiece with extra batteries.
- Extra vision aids such as an electronic travel aid, monocular, binocular or magnifier.
- Extra pair of prescription glasses – if you wear them.
- Any reading devices/assistive technology to access information/ portable CCTV devices.
- Any other contingency supplies unique to your special needs.

Dos & Don'ts

Assisting People with Disabilities

✔ Always ask first if you can be of any assistance to them.

✔ For people who are deaf-blind, use your finger to draw an "X" on their back to let them know you are there to help during an emergency.

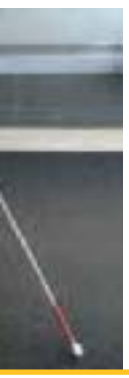
✔ To communicate with a deaf-blind person, try tracing letters with your finger on the palm of their hand.

✔ To guide the person, offer them your arm instead of taking theirs and walk at their pace. Keep half a step ahead of them.

✔ If the person has a service dog, ask them where you should walk to avoid distracting the animal.

✔ Provide advance warning of upcoming stairs, curbs, major obstacles, or changes in direction.

✔ Watch for overhangs or protrusions the person could walk into.



✘ Do not assume the person cannot see you, or that they need your help.

✘ Never grab or touch a person with vision loss.

✘ Do not touch, make eye contact or distract the person's service dog as this can seriously endanger the owner.

✘ Do not shout at a person with vision loss. Speak clearly and provide specific and precise directions.

✘ Avoid the term "over there". Instead, describe locating positions such as, "to your right/left/straight ahead/ behind you", or by relaying clock face positions. (For example: 12 o'clock)

Hearing

A person can be deaf, deafened or hard of hearing. The distinction between these terms is based on the individual's language and means of communicating rather than the degree of hearing loss.

In an emergency, the method in which emergency warnings are issued becomes critical to how a person with hearing loss is able to respond and follow instructions to safety.

Your Emergency Plan:

- If your network is unavailable during an emergency, seek the assistance of others to whom you can communicate your hearing loss by spoken language, moving your lips without making a sound, pointing to your ear, using a gesture, or if applicable, pointing to your hearing aid.
- Keep a pencil and paper handy for written communication.
- Obtain a pager that is connected to an emergency paging system at your workplace and/or the building that you live in.
- Install a smoke-detection system that includes smoke alarms and accessory flashing strobe lights or vibrators to gain your attention if the alarms sound.
- Test smoke alarms on a monthly basis by pushing the test button.
- Replace batteries in battery-operated smoke alarms every six months and whenever the low-battery warning sounds.
- Keep a laminated card on your person and in your survival kit that identifies you as deaf or hard of hearing and explains how to communicate with you.

Dos & Don'ts

Assisting People with Disabilities

- ✔ Get the person's attention via a visual cue or a gentle touch on their arm before speaking to them.
- ✔ Face the person and make eye contact when speaking to them as they may rely on speechreading.
- ✔ Communicate in close proximity.
- ✔ Speak clearly and naturally.
- ✔ Use gestures to help explain the meaning of what you are trying to communicate to the person.
- ✔ Write a message if there is time and keep a pencil and paper handy.
- ✘ Avoid approaching the person from behind.
- ✘ Refrain from shouting or speaking unnaturally slowly.
- ✘ Do not make loud noises as hearing aids amplify sounds and can create a physical shock to the user.

Additional Items
Emergency Survival Kit

- ■ Extra writing pads and pencils for communication.
- ■ Flashlight, whistle or noisemaker.
- ■ Pre-printed key phrases you would use during an emergency.
- ■ Assistive devices - unique to your needs (e.g., hearing aid, pager, personal amplifier, etc.).
- ■ Portable visual notification devices that allow you to know if a person is knocking on the door, ringing the doorbell, or calling on the telephone.
- ■ Extra batteries for assistive devices.
- ■ A CommuniCard (produced by The Canadian Hearing Society) that explains your hearing loss and also helps identify how rescuers or assisters can communicate with you during an emergency.
- ■ Any other contingency supplies unique to your special needs.

Note: Typically people who are deafened or hard of hearing will need information presented in a text format.

Non-Visible Disabilities

Non-visible disabilities can include communication, cognitive, sensory, mental health, learning or intellectual disabilities in which an individual's ability to respond to an emergency is restricted. They can also range from allergies, epilepsy, hemophilia, diabetes, thyroid condition, multiple sclerosis, pulmonary or heart disease and/or dependency on dialysis, sanitary or urinary supplies. Individuals with non-visible disabilities may have difficulty performing some tasks without appearing to have a disability.

Your Emergency Plan:

- Prepare an easy-to-understand list of instructions or information for yourself that you think you may need in an emergency.
- Keep an emergency contact list on your person of key people that are aware of your special needs.
- Inform your designated support network of where you store your medication.
- Keep a pencil and paper or portable electronic recording device handy to write down or record any new instructions provided to you in an emergency.
- Consider owning and wearing a MedicAlert® bracelet or identification because it will help notify emergency responders about your non-visible disabilities. For more information visit: www.medicalert.ca.
- Request a panic push-button to be installed in the building you work and/or live in, so that in the event of an emergency you can notify others of your whereabouts and that you need special assistance.
- **People with Multiple Sclerosis:** Symptoms are often made worse by heat and humidity. Be prepared to keep cool and dry.
- **People with Diabetes:** Keep frozen water bottles or ice packs in your freezer. Have an insulated bag or cooled thermos ready to store your insulin, should there be a power outage or you need to evacuate.

Dos & Don'ts

Assisting People with Disabilities

- ✔ Allow the person to describe what help they need from you.
- ✔ Find effective means of communication (e.g., provide drawn or written instructions. When giving directions use landmarks instead of terms “go left” or ”turn right”).
- ✔ Be patient, flexible and maintain eye contact when speaking to the person.
- ✔ Repeat instructions (if needed).
- ✔ Ask the person about their medication and if they need any help taking it. (Never offer medicines not prescribed by their physician.)
- ✔ Keep people with multiple sclerosis cool and dry to avoid making their symptoms worse.
- ✘ Avoid shouting or speaking quickly. Instead, speak clearly but not so slowly as to offend the person.
- ✘ Do not restrain a person having a convulsion. Instead, roll them on their side to keep their airway clear and place something soft (e.g., your jacket) under their head to protect it from injury. Once the convulsion passes and they become conscious, help them into a resting position.

Additional Items

Emergency Survival Kit

- Supply of food items appropriate to your disability or dietary restrictions.
- List of instructions that you can easily follow in an emergency.
- Personal list and minimum three days supply of all needed medications, medical supplies and special equipment (e.g., ventilator for asthma, nitrolingual spray for heart condition, Epinephrine pen against allergic reaction/anaphylactic shock, etc.).
- Detailed list of all prescription medications.
- MedicAlert® identification.
- Any other contingency supplies unique to your special needs.

For Example: People with Diabetes

- Extra supply of insulin or oral agent.
- Extra supply of syringes, needles and insulin pens (if used).
- Small container for storing used syringes/needles (if applicable).
- Blood glucose testing kit, spare batteries and record book.
- Supply of blood glucose and urine ketone testing strips.
- Fast-acting insulin for high blood glucose (if applicable).
- Fast-acting sugar for low blood glucose.
- Extra food to cover delayed meals.
- Ice packs and thermal bag to store insulin (if applicable).

Seniors with Special Needs

Since an emergency situation or an evacuation can be a frightening and confusing time, it is important that seniors, especially those with special needs, know the steps to take in an emergency. This includes seniors contacting their local municipal office to find out about programs and services available in their community that will help them during an emergency and assist them to return to their regular routine.

Your Emergency Plan:

- Create an emergency contact list with names and telephone numbers of your physicians, case worker, contact for your seniors group, neighbours, building superintendent, etc. Keep a copy of this list in your survival kit and on your person.
- Write down the names and phone numbers of on-site doctors, nurses, social workers, etc., at your place of residence (if applicable), including the hours they keep.
- Familiarize yourself with all escape routes and location of emergency doors/exits in your home.
- Know the location of emergency buttons. (Many seniors' buildings have emergency buttons located in bedrooms and washrooms that have a direct link to 911 or the building's superintendent.)
- If asked to evacuate, bring with you any equipment or assistive devices you may need immediately.
- Always wear your MedicAlert® identification.

Dos & Don'ts

Assisting People with Disabilities

- ✔ Check on neighbours who are seniors with special needs to find out if they need your help during an emergency or evacuation.
- ✔ Allow the person to describe what help they need and how it can be provided to them.
- ✔ Be patient, listen actively.
- ✔ If the person appears anxious or agitated, speak calmly and provide assurance that you are there to help.
- ✔ If evacuation is necessary, offer a ride to seniors who do not have access to a vehicle.
- ✔ If time permits, offer to carry the person's emergency survival kit to your car, along with any equipment or assistive devices they will need.
- ✔ Follow instructions posted on special needs equipment and/or assistive devices during an emergency.

- ✘ Refrain from shouting or speaking unnaturally slowly.
- ✘ Avoid being dismissive of the person's concerns or requests.

Additional Items
Emergency Survival Kit

- ■ Supply of food items appropriate to your disability or dietary restrictions.
- ■ Assistive devices needed such as canes, walkers, lightweight manual wheelchair, hearing aids, breathing apparatus, blood glucose monitoring device, etc.
- ■ Prescription eyewear and footwear (if required).
- ■ Extra supply of medications and vitamin supplements.
- ■ Personal disability-related list of all your needed medical supplies and special equipment.
- ■ Copies of all medication prescriptions.
- ■ Extra dentures (if required) and cleaner.
- ■ Latex-free gloves (to give to anyone providing personal care to you).
- ■ Any other contingency supplies unique to your special needs.

For Seniors with Diabetes:

- ■ Please refer to previous "Other Non-Visible Disabilities" category.

Highrise Safety

High-rise buildings present unique challenges when evacuation is necessary during an emergency.

Residents should make themselves aware of:

- ✔ Building superintendent's name and phone number.
- ✔ Who sits on the Building Safety Committee.
- ✔ Who the floor monitors are.
- ✔ Who conducts evacuation drills, and how often.
- ✔ Location of fire extinguishers, automated external defibrillator units, and oxygen tank.
- ✔ Location of emergency evacuation device(s).

Your Emergency Plan:

- Advise your building manager/superintendent of your special needs and/or requirements during an emergency.
- Familiarize yourself with your building's evacuation plan.
- Know where all escape routes and location of emergency doors/exits are on each floor.
- Know the location of emergency buttons in the building and exits that are wheelchair-accessible (if applicable).
- Request that an emergency evacuation chair be installed on the floor you live or work on, preferably close to the stairwell (if applicable).
- If you live in a highrise building, create a '**buddy**' system with your neighbours and regularly practise your emergency response plan with them.
- If you rely on any life sustaining equipment/ apparatus, develop an emergency back-up plan that will ensure the equipment/ apparatus is operable in the event of a power outage.
- Obtain large printed signs from the building manager that you can place in your window in the event of an emergency, indicating that you need assistance.

Dos & Don'ts

Assisting People with Disabilities

- ✔ Check on neighbours and/or co-workers with special needs to find out if they need your help during an emergency or evacuation.
- ✔ Listen actively to what the individual with special needs is saying.
- ✔ During an emergency evacuation (if time permits), offer to carry the person's emergency survival kit for them along with any special equipment or assistive devices they will need.
- ✔ Review previous categories in this guide on how to assist people with specific disabilities and/or special needs.
- ✘ In general, avoid attempts to lift, support or assist in moving a person down the stairs, unless you are familiar with safe techniques.

Additional Items

Emergency Survival Kit

- Personal alarm that emits a loud noise to draw attention to your whereabouts.
- Supply of food items appropriate to your dietary restrictions.
- Supply of medications and assistive devices appropriate to your disability.
- Supply of plastic bags for storing garbage/personal waste.
- Names and contact information of your neighbours, superintendent and property/building manager.
- Laminated copy of your building's evacuation plan and diagram of escape routes and location of emergency doors/exits on each floor.
- Any other contingency supplies unique to your special needs.

Travel Considerations

Whether travelling locally or internationally, people with disabilities and seniors with special needs should take extra time to research and plan their trip to make their travel experience safe and enjoyable. This includes preparing in advance, an emergency plan and "Ready-Go-Bag" with emergency survival items.

Your Emergency Plan:

- Before travelling, visit the **Foreign Affairs and International Trade Canada** website at www.voyage.gc.ca where you can register and find other helpful travel information safety tips.
- Discuss your particular accommodation needs with your travel agent.
- Discuss your trip with your doctor to prepare contingency plans in case of illness.
- Obtain necessary travel medical insurance.
- Carry a copy of the booklet **Bon Voyage, But...**, that contains contact information for your destination's Canadian office and Emergency Operations Centre. You can order it free of charge at www.voyage.gc.ca.
- Divide your medications and medical supplies between your carry-on and check-in baggage, keeping them in their original labelled containers. Bring copies of your prescriptions with you.
- Always wear your MedicAlert® bracelet.
- Inform your travel companion(s) on how to assist you in an emergency.
- If travelling alone, establish a network (e.g., hotel staff) that can assist you during an emergency.
- If you have difficulty using stairs request a room on a lower floor.
- Review the hotel emergency exit plan.
- If needing to evacuate, bring your emergency "Ready-Go-Bag" and any assistive devices you may need.

Dos & Don'ts

Assisting People with Disabilities

- ✔ Check on fellow travellers with visible disabilities or special needs to find out if they need your help during an emergency or evacuation.
- ✔ Listen actively to what the individual with special needs is saying and how they might need your help.
- ✔ If they speak in a foreign language that you do not understand, try to communicate using gestures.
- ✔ During an emergency evacuation (if time permits), offer to carry the person's emergency survival kit for them along with any special equipment or assistive devices they will need.
- ✔ Review previous categories in this guide on how to assist people with specific disabilities or special needs.
- ✘ Do not let the person be separated from their wheelchair or mobility aids.

Additional Items

Emergency Survival Kit

- ☐ Supply of food items appropriate to your dietary restrictions.
- ☐ Supply of medications/assistive devices appropriate to your disability (e.g., **Glucagen injection** if you manage your diabetes with insulin and you are travelling to a remote location that does not have ambulance service).
- ☐ Laminated personal information card that you keep on your person at all times when travelling. (Card identifies your special needs, lists all medications you are taking, any food/drug allergies you might have, your treating physician's name and contact information, and your next of kin.)
- ☐ Copy of your travel medical insurance and other important travel documents.
- ☐ A personal alarm that emits a loud noise to draw attention to your whereabouts.
- ☐ Small container that can store or disintegrate syringes or needles safely (if applicable).
- ☐ Anti-nausea and anti-diarrhea pills and pain medication.
- ☐ Sunblock.
- ☐ Insect repellent.
- ☐ Dictionary to help you communicate in a foreign language.
- ☐ Any other contingency supplies unique to your disability or special needs.

For More Information

Specific Disabilities and Special Needs

Canadian Diabetes Association
Tel: 416-363-3373
Toll-free Phone: 1-800-226-8464
Fax: 416-408-7117
www.diabetes.ca

Canadian Paraplegic Association Ontario
Tel: 416-422-5644
Toll-free Phone: 1-877-422-1112
Fax: 416-422-5943
Email: info@cpaont.org
www.cpaont.org

Canadian Red Cross
Tel: 905-890-1000
Fax: 905-890-1008
www.redcross.ca

Centre for Independent Living in Toronto (CILT) Inc.
Tel: 416-599-2458
TTY: 416-599-5077
24hr Newsline: 416-599-4898
Fax: 416-599-3555
Email: cilt@cilt.ca
www.cilt.ca

CNIB
Tel: 416-486-2500
Toll-free Phone: 1-800-563-2642
TTY: 416-480-8645
Fax: 416-480-7700
www.cnib.ca

Learning Disabilities Association of Ontario
Tel: 416-929-4311
Fax: 416-929-3905
www.ldao.ca

Multiple Sclerosis Society of Canada - Toronto Chapter and Ontario Division
Tel: 416-922-6065
Toll-free Phone: 1-866-922-6065
Fax: 416-922-7538
www.mssociety.ca

Ontario March of Dimes
Tel: 416-425-3463
Toll-free Phone: 1-800-263-3463
Fax: 416-425-1920
www.dimes.on.ca

Ontario SPCA (Ontario Society for the Prevention of Cruelty to Animals)
Tel: 905-898-7122
Toll-free Phone: 1-888-ONT-SPCA (668-7722)
Fax: 905-853-8643
E-mail: info@ospca.on.ca
www.ontariospca.ca

The Canadian Hearing Society
Tel: 416-928-2500
Toll-free Phone: 1-877-347-3427
TTY: 416-964-0023
Toll-free TTY: 1-877-347-3429
Fax: 416-928-2523
www.chs.ca

Toronto Rehabilitation Institute
Tel: 416-597-3422
Fax: 416-597-1977
www.torontorehab.com

Accessibility Initiatives

Accessibility Directorate of Ontario
Tel: 416-326-0207
Toll-free Phone: 1-888-520-5828
TTY: 416-326-0148
Toll-free TTY: 1-888-335-6611
Fax: 416-326-9725
www.mcss.gov.on.ca

Ontario Seniors' Secretariat
Tel: 416-326-7076 (Seniors' INFOline)
Toll-free Phone: 1-888-910-1999
Toll-free TTY: 1-800-387-5559
Fax: 416-326-7078
www.ontarioseniors.ca

Emergency Preparedness

Emergency Management Ontario
Tel: 416-314-3723
Toll-free Phone: 1-877-314-3723
Fax: 416-314-3758
www.ontario.ca/emo

For Information on MedicAlert® Bracelets or Identification

Canadian MedicAlert® Foundation
Tel: 416-696-0142
Toll-free Phone: 1-800-668-1507
Toll-free Fax: 1-800-392-8422
www.medicalert.ca

For Travel Advice and Registration Service when Travelling Abroad

Foreign Affairs and International Trade Canada
Tel: 613-944-6788
TTY: 613-944-1310
In Canada and USA:
Toll-free Phone: 1-800-267-6788
Toll-free TTY: 1-800-394-3472
www.voyage.gc.ca

Local Emergency Management Contact:

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Available in English

College of Respiratory Therapists of Ontario

Useful Web Resources

Respiratory Related Sites

West Park Healthcare Centre

Includes online e-learning modules, example:

- Respiratory Anatomy and Physiology
- Tracheal Suctioning and Manual Ventilation
- Tracheostomy Tubes and Stoma Care
- Introduction to Long Term Mechanical Ventilation (Invasive)

http://www.ltvcoe.com

The Institute for Rehabilitation Research and Development (The Rehabilitation Centre Ottawa)

Includes "Respiratory Protocols for SCI and Neuromuscular Diseases":

- Anatomy and Physiology
- Clinical Pathway
- Interventions (LVR with bag, MI-E, ventilator, and GPB)
- CoughAssist™ - New Generation of MI-E
- Mechanical Insufflation/Exsufflation Policy
- Lung Volume Recruitment with Resuscitation Bag Policy

http://www.irrd.ca/education/

The Ventilator Equipment Pool

http://www.ontvep.ca/

The Ministry of Health & Long-Term Care, Assistive Devices Program, Respiratory Devices Category Administration Manual (June 2007)

http://www.health.gov.on.ca/english/providers/pub/adp/resp_manual_20070627.pdf

Aaron's Tracheostomy Page

A web site that provides information about tracheostomy

http://www.tracheostomy.com/

Information on Diseases

ALS Society of Canada
http://www.als.ca

Chronic Obstructive Airway Disease (COPD)-Canadian Lung Association
http://lung.ca/diseases-maladies/copd-mpoc_e.php

Cystic Fibrosis
http://www.cysticfibrosis.ca

Multiple Sclerosis Society of Canada
http://www.mssociety.ca/en/default.htm

Muscular Dystrophy of Canada
http://www.muscle.ca

Ontario March of Dimes/March of Dimes Canada
http://www.marchofdimes.ca/dimes

Post Polio Health International
http://www.post-polio.org

Spinal Muscular Atrophy
http://www.smafoundation.org

Government Listings and Publications

Assistive Devices Program (Ontario Ministry of Health & Long Term Care)
http://www.health.gov.on.ca/english/public/program/adp/adp_mn.html

ADP Respiratory Manual
http://www.health.gov.on.ca/english/providers/program/adp/product_manuals/respiratory_devices.pdf

How to Hand Wash
http://www.health.gov.on.ca/en/ms/handhygiene/video/hand_wash.aspx

Best Practices for Hand Hygiene in all Healthcare Settings
http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_hh_20080501.pdf

Health Canada: Health Products and Food Branch
http://www.hc-sc.gc.ca/index-eng.php

Ontario's Community Care Access Centres
http://www.health.gov.on.ca/english/public/contact/ccac/ccac_mn.html

Associations/Agencies

Canadian Paraplegic Association Ontario
http://www.cpaont.org

Canadian Sleep Society
http://www.css.to

College of Physicians and Surgeons of Ontario
http://www.cpso.on.ca

College of Respiratory Therapists of Ontario
http://www.crto.on.ca

Canadian Society of Respiratory Therapists
http://www.csrt.com

International Ventilator Users Network
http://www.ventusers.org

Ontario Hospital Association
http://www.oha.com

Respiratory Therapy Society of Ontario
http://www.rtso.ca/

The BC Association for Individualized Technology and Supports for People with Disabilities: Home of the Provincial Respiratory Outreach Program (PROP)
http://www.bcits.org/default.htm

The Canadian Lung Association
http://www.lung.ca

The Ontario Lung Association
http://www.on.lung.ca

Home/Long Term Ventilation Education

AARC Clinical Practice Guideline
Long-Term Invasive Mechanical Ventilation in the Home – 2007 Revision & Update
http://www.rcjournal.com/cpgs/pdf/08.07.1056.pdf

AARC Clinical Practice Guideline
Providing Patient and Caregiver Training
http://www.rcjournal.com/cpgs/pcgtcpg.html

AARC Clinical Practice Guideline
Training the Health-Care Professional for the Role of Patient and Caregiver Education
http://www.rcjournal.com/cpgs/thcpcpg.html

AARC Clinical Practice Guideline
Pulse Oximetry
http://www.rcjournal.com/cpgs/pulsecpg.html

Battery University is an on-line resource that provides practical battery knowledge
http://www.batteryuniversity.com

Emergency Management Ontario: Emergency Preparedness Guide for People with Disabilities/Special Needs
http://www.emergencymanagementontario.ca/stellent/idcplg/webdav/Contribution%20Folders/emo/documents/Disability%20Guide_Eng.pdf

http://www.getprepared.ca

IVUN-Home Ventilator Guide
http://www.ventusers.org/edu/HomeVentGuide.pdf

The Institute for Rehabilitation Research and Development: The Rehabilitation Centre, Ottawa: Respiratory Protocols for Spinal Cord Injuries and Neuromuscular Disease
http://www.irrd.ca/education/default.asp

The Toronto East General Hospital Progressive Weaning Centre
Provincial Centre of Excellence
http://www.tegh.on.ca/bins/content_page.asp?cid=3-2850&lang=1&pre=view

West Park Healthcare Centre Long-Term Ventilation Centre of Excellence: On-line e-learning modules
http://www.ltvcoe.com/index.html

Chronic Ventilation Strategy Task Force: Final Report, June 30, 2006
http://www.health.gov.on.ca/english/providers/program/critical_care/docs/report_cvtg.pdf

Vendors

The Porta-Lung
http://portalung.com/index.htm

Breathing Pacemakers: Avery Biomedical
http://www.averylabs.com/index.html

Diaphragm Pacing System: Synapse Biomedical
http://www.synapsebiomedical.com/products/neurx.shtml

Cough Assist Device
http://www.coughassist.com

Respironics
http://www.healthcare.philips.com/main/homehealth/index.wpd

Resmed Corporation
http://www.resmed.com/en-en

Fisher & Paykel HealthCare
http://www.fphcare.com

Carestream Medical
http://www.carestream.com

Draegar Medical-Canada
http://www.draeger.com/CA/en_US/

Quadromed Inc.
http://www.quadromed.com/en/index.html

Passy-Muir Tracheostomy and Speaking Valves
http://www.passy-muir.com

Bivona Tracheostomy Tubes
http://www.smiths-medical.com/catalog/bivona-tracheostomy-tubes

Shiley® Tracheostomy Tubes
http://www.nellcor.com/prod/list.aspx?S1=AIR&S2=TTA

Instrumentation Industries, Inc
http://www.iiimedical.com

Intersurgical Complete Respiratory Systems
http://www.intersurgical.com

Hans Rudolph Inc.
http://www.rudolphkc.com

DeVilbiss Healthcare
http://www.devilbisshealthcare.com

Cardinal Health
http://www.cardinalhealth.com

Covidien
http://www.covidien.com

Lifetronics
http://www.lifetronics.com

Advance for Managers of Respiratory Care
At-a glance charts detailing various interface/mask products available
http://respiratory-care-manager.advanceweb.com/Sharedresources/advanceforMRC/Resources/DownloadableResources/MR040108_p64AirwayBG.pdf

Section #4: Appendices

Appendix A
Assistive Devices Program
Equipment/Supply Authorization Form (Sample)

Appendix B
Quick Reference Guide to LTV® 900, 950 & 1000 Series Ventilators

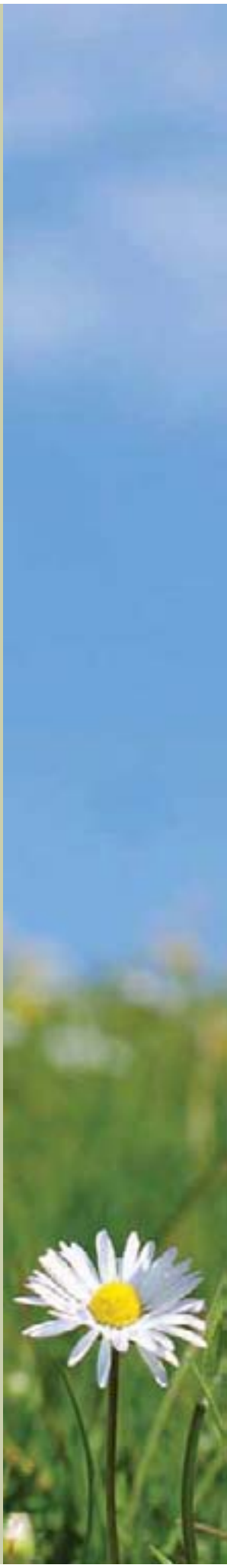
Appendix C
Quick Reference Guide to LTV® 1200/1150 Series Ventilators

Section #4: Appendices

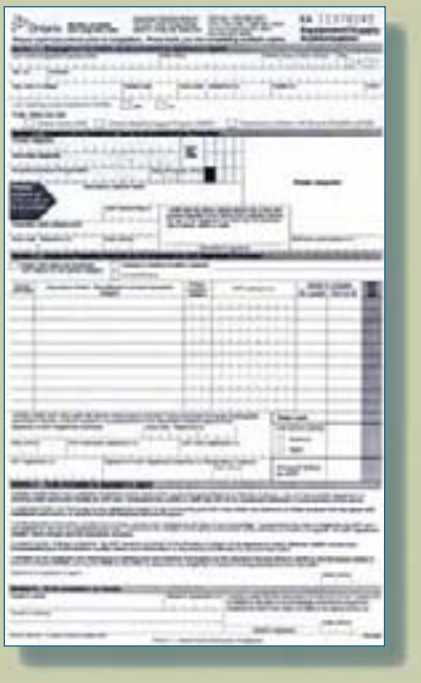
Appendix A
Assistive Devices Program
Equipment/Supply Authorization Form (Sample)

Appendix B
Quick Reference Guide to LTV® 900, 950 & 1000 Series Ventilators

Appendix C
Quick Reference Guide to LTV® 1200/1150 Series Ventilators



Appendix A
Equipment/Supply Authorization Form (Sample)



Appendix A
Equipment/Supply Authorization Form (Sample)

Notes

Ontario Ministry of Health and Long-Term Care

Assistive Devices Branch
7th floor, 5700 Yonge Street
NORTH YORK ON M2M 4K9

Toll Free 1 800 268-6021
TDD (Toll Free) 1 800 387-5559
Toronto Area 416 327-8804
Fax 416 327-8192

EA 11378242

Equipment/Supply Authorization

Please read instructions prior to completion. Press hard, you are completing multiple copies.

Section 1 – Biographical Information (to be completed by Applicant or Agent)

Last name of applicant *(please print)* | First name | Initials | Date of birth (d/m/y) | Sex ☐ M ☐ F

Apt. no. | Address

City, town or village | Postal code | Area code Telephone no. | Health no. | Version

I am receiving social assistance benefits. ☐ yes ☐ no

If yes, check one only:

☐ Ontario Works (OW) ☐ Ontario Disability Support Program (ODSP) ☐ Assistance to Children with Severe Disabilities (ACSD)

Section 2 – Diagnosis and Equipment Type (to be completed by Prescriber)

Primary diagnosis | Insert diag. codes

Secondary diagnosis

Surgical procedure (if applicable) | Date of surgery (d/m/y)

Instructions, special needs

Please ensure all information is provided

Plate Imprint

Health insurance billing no.

I certify that the above named person has a long term physical disability and/or illness and medically requires the use of the equipment for other than the exclusive use of sports, school or work.

Prescriber name *(please print)*

Area code Telephone no. | Date (d/m/y)

Prescriber's signature

ADP prior authorization no.

Section 3 – Equipment/Supplies Required (to be completed by ADP Registered Authorizer)

☐ Check if the client has accessed ADP before for this device category

☐ Change in medical condition *(specify)* _____

☐ Growth/Atrophy

Quantity authorized	Description of item: Brand/Model or product equivalent category	Product equivalent category	ADP catalogue no.	Vendor to complete: Qty. supplied	Vendor to complete: Total cost ($)	ADP use only

I hereby certify that I have seen the above named person and that I have authorized the equipment/supplies described in Section 3 above, based on my assessment of this individual's medical requirements.

Signature of ADP Registered Authorizer | Area code Telephone no.

Date (d/m/y) | ADP authorizer registration no. | ADP clinic registration no.

ADP registration no. | Signature of ADP Registered Dispenser or Rehabilitation Assessor | Date (d/m/y)

Total cost

Less amount paid by:

☐ Applicant

☐ Agent

Amount billed to ADP

Section 4 – To be completed by Applicant or Agent

I hereby certify that I am a resident of Ontario and in need of the equipment prescribed as in Section 3 above. I do not have similar equipment in working order previously funded by ADP and I understand the vendor or ADP may bill me for equipment obtained in contravention of the above.

I understand that I am free to go to any registered vendor in the community and that I may obtain the locations of these vendors from the above ADP registered authorizers, or directly from the Assistive Devices Program.

I certify that the information on this form is true, correct and complete to the best of my knowledge. I understand the rules of eligibility for ADP and I am eligible for the above supplies/equipment. I authorize the release of the above information to the Ministry of Health, its agents the ADP registered vendor I have chosen and my insurance company.

I consent to the "indirect collection" by ADP vendors on behalf of the Ministry of Health of the applicant's name, address, health number and Equipment/Supply Authorization number where such information is required by the Ministry to process this claim.

I consent to the collection and disclosure of medical and non-medical information by the Assistive Devices Branch (ADB) to the Workplace Safety & Insurance Board (WSIB), and by the WSIB to the ADB, to determine my eligibility to receive funding assistance from the ADB.

Signature of applicant or agent | Date (d/m/y)

Section 5 – To be completed by Vendor

Vendor's name | Vendor's registration no.

Vendor's address

I hereby certify that the information on this form is true, correct and complete to the best of my knowledge and that the equipment /supplies as listed have been provided to the above person by

Vendor's signature | Date (d/m/y)

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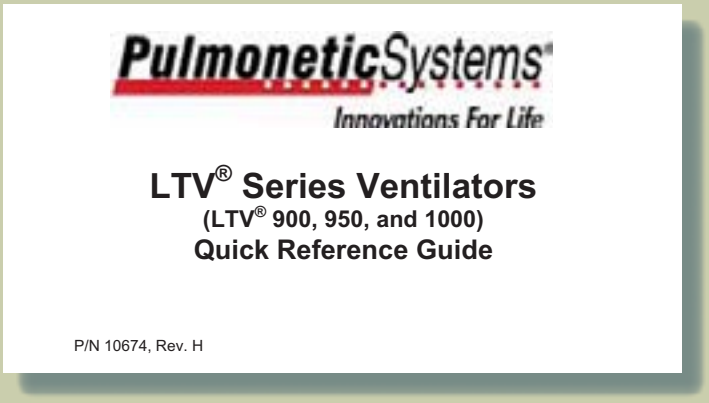
Part 1 – Assistive Devices Program

Appendix B
Quick Reference Guide for LTV® 900, 950 & 1000 Series Ventilators



Appendix B
Quick Reference Guide for LTV® 900, 950 & 1000 Series Ventilators

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LTV® Series Ventilators

(LTV® 900, 950, and 1000)

Quick Reference Guide

P/N 10674, Rev. H

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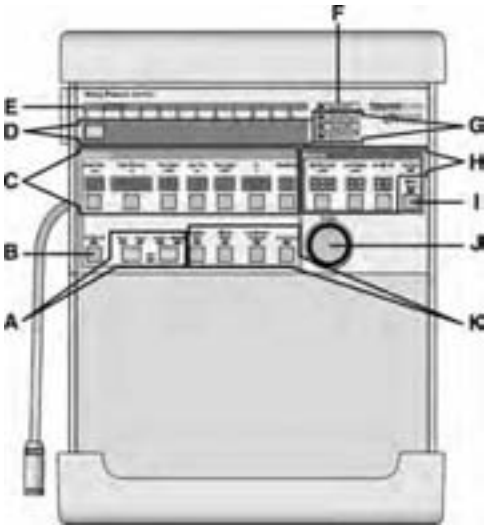
FRONT AND SIDE PANEL REFERENCE

Front Panel Display and Description



A - **Mode and Breath Selection** – Selects ventilation modes. Selects breath types.

B - **Power** – Turns ventilator “On” or to “Standby.”

C - **Variable Control Settings** – Sets ventilation characteristics, such as Tidal Volume and Breath Rate.

D - **Display Window** – Displays Alarm Messages, Monitored Data, Extended Features menu.

E - **Airway Pressure Display** – Displays real-time airway circuit pressure.

F - **Patient Effort Indicator** – LED is lit briefly each time a patient trigger is detected.

G - **Power Source** – Displays power source and charge levels.

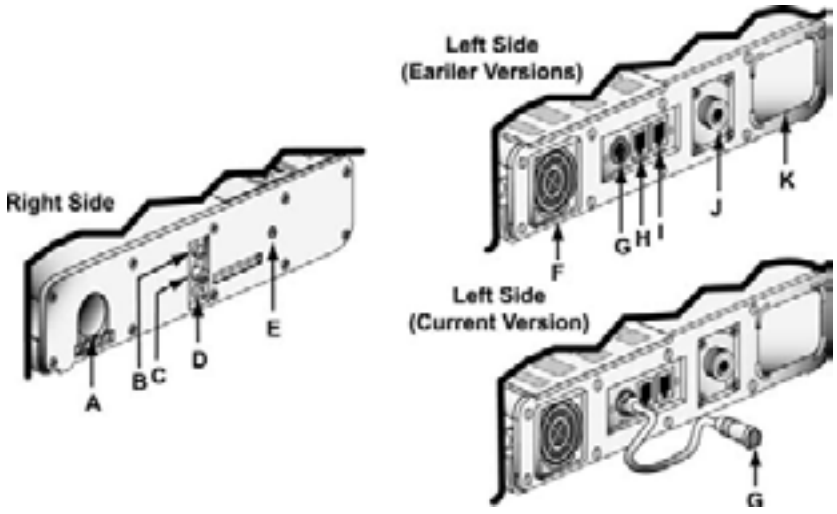
H - **Variable Alarm Settings** – Sets variable alarm levels.

I - **Alarm Silence/Reset** – Silences audible alarms. Clears visual alarms.

J - **Set Value Knob** – Changes variable control settings. Navigates Extended Features menu.

K - **Special Controls** – Activates special controls such as Manual Breath, Low Pressure O_2 Source, Insp/Exp Hold or Control Lock feature.

Side Panel Descriptions



A - **22mm Outlet Port** – Patient Breathing Circuit outlet port.
B - **Flow Xducer** – Flow Transducer high pressure sensing port.
C - **Flow Xducer** – Flow Transducer low pressure sensing port.
D - **Exh Valve** – Exhalation Valve drive line port.
E - **Alarm Sounder Port**
F - **Cooling Fan**
G - **DC Input** – External DC power port (earlier version)
or DC power port pigtail connector (current version).
H - **Patient Assist** – Patient Assist Call jack.
I - **Comm Port** – Communications port.
J - **O_2 Inlet** – Oxygen Inlet fitting.
K - **Filter** – Air Inlet.

TURNING THE VENTILATOR ON AND OFF

Turning the Ventilator On

To turn the LTV® ventilator on:

1) Connect the ventilator to an external power source:
   - The AC power adapter may be used or the ventilator may be connected to an external battery.
   - **If you do not connect the ventilator to an external power source, it will operate from the internal battery.**

2) Press and release the **O**n/**S**tandby button. The ventilator will commence operation:
   - The **O**n/**S**tandby LED is lit and the Power On Self Tests (POST) are run. During POST;
     - The front panel displays are illuminated.
     - Verify the audible alarm is activated for 1 second (only on ventilators with a symbol on the back panel label).
     - Verify a confirming audible chirp is activated (only on ventilators with a symbol on the back panel label).
3) Once POST is successfully completed, the ventilator begins operating using the stored control settings.

Turning the Ventilator Off

To turn the LTV® ventilator off:

1) **Disconnect the patient from the ventilator**.
2) Press and hold the **O**n/**S**tandby button for 3 seconds. The ventilator ceases operating, the audible alarm sounds continuously and the **Vent Inop** LED is lit.

3) Press the **S**ilence/**R**eset button to silence the audible alarm.
   - Verify a confirming audible chirp is activated immediately after the alarm is silenced (only on ventilators with a symbol on the back panel label).

4) The ventilator continues to charge the internal battery as long as it is connected to an external power source.

Note: The **Vent Inop** LED will remain lit for a minimum of 5 minutes and does not affect battery life.

VENTILATOR CHECKOUT TESTS

WARNING - Disconnect the patient from the ventilator prior to running the Ventilator Checkout tests and ventilate the patient using an alternative method. The ventilator does not deliver gas during the Ventilator Checkout tests.

To enable the Ventilator Checkout menu:

1) Begin with the ventilator in Standby mode (off) and connected to a valid AC power source.
   - Verify that the **External Power** and **Charge Status** LEDs are illuminated.
2) Press and hold the Monitor **S**elect button. While holding the **S**elect button, press the **O**n/**S**tandby button.
   - **REMOVE PTNT** alarm message is displayed and an audible alarm is sounded.

3) Clear the alarm by pressing the **S**ilence/**R**eset button.
   - Audible alarm is silenced and **VENT CHECK** is displayed.

4) Press the **S**elect button to move to the first test.
   - The first Ventilator Checkout Test, **ALARM**, is displayed.

Alarm Test

The alarm Test is used to verify that the audible alarm is working correctly.

1) Press the **S**elect button while **ALARM** is displayed.

2) Verify the audible alarm is sounded.
   - If a Patient Assist Call System or Remote Alarm is connected via the ventilator's Patient Assist Port, verify the device also activates (audible/visual), as specified by its manufacturer.
3) When the alarm has sounded for at least 2 seconds, press the **S**elect button again.

   - The audible alarm is silenced and the next menu item is displayed.
4) For ventilators with an audio sound symbol (♪) on the back panel label, verify a confirming audible chirp occurs after the alarm is silenced.

Display Test

The display Test is used to verify that the ventilator displays are working correctly.

To run the Display Test:

1) Press the **S**elect button while **DISPLAY** is displayed.

2) All segments of the 7-segment control displays, all dots of the dot-matrix window displays and all LEDs are illuminated.
   - The **External Power** and **Charge Status** LEDs are tested and verified when the AC adapter is connected to the ventilator (see page 7).
   - The **Vent Inop** LED is tested and verified during the Vent Inop Alarm Test (see page 12).

3) To end the display test, press the **S**elect button again and the next menu item is displayed.

Control Test

The Control Test is used to verify that the ventilator buttons and controls are working correctly.

To run the Control Test:

1) Press the **S**elect button while **CONTROL** is displayed.

2) **SELECT** is displayed in the display windows.

3) To test each control, press the button. The name of the button is displayed in the display window. To test the **S**et **V**alue knob, turn it clockwise and counterclockwise. The direction of rotation is displayed in the display window.

4) To exit the control test, press the **S**elect button again and the next menu item is displayed.

Leak Test

The Leak Test is used to test the patient circuit for leaks. The patient circuit should be tested with all accessories, such as humidifiers or water traps, in place.

To run the Leak Test:

1) Cap or otherwise occlude the patient circuit wye.
2) Press the **S**elect button while **LEAK** is displayed.

   - To perform the Leak Test, the ventilator closes the exhalation valve, sets the flow valve to a near-closed state, elevates the turbine motor speed and elevates the circuit pressure.
   - At the conclusion of the test, the display shows **LEAK xx.x pass** or **fail**, where **xx.x** is the measured leak.
3) To exit the Leak Test, press the **S**elect button again and the next menu item is displayed.

Vent Inop Alarm Test

The Vent Inop Alarm Test is used to verify that the Inop Alarm is working correctly.

To run the Vent Inop Alarm Test:

1) To run the Vent Inop Alarm Test, the ventilator must be on (running) for at least 60 seconds and the Ventilator Checkout menu must be enabled.
2) Turn the ventilator off by pressing and holding the **O**n/**S**tandby button for a minimum of 3 seconds. **DO NOT** press the **S**ilence/**R**eset button.

3) Observe the ventilator for 15 seconds.
   - Listen for the alarm tone
   - Watch the Vent Inop LED
4) For all ventilators, verify that both of the following conditions existed;
   - The alarm tone sounded continuously for the full 15-second duration.
   - The Vent Inop LED illuminated continuously for the full 15-second duration.
5) If a Patient Assist Call System or Remote Alarm is connected via the ventilator's Patient Assist Port, verify the device also activates (audible/visual), as specified by its manufacturer.
6) Silence the alarm by pressing the **S**ilence/**R**eset button.

7) For ventilators with an a audio sound symbol ( ) on the back panel label, verify the following condition existed;
   - A confirming audible chirp occurred after the alarm was silenced.

When the Ventilator Checkout Tests have been completed, proceed to ***Exit*** for instructions to exit the vent check mode, or see below concerning the use of the Set Defaults option.

Set Defaults

The Set Defaults option is used to reset user settable Controls and Extended Features settings to their factory-set default values (see the *LTV® 1200 Series Ventilators Operator's Manual* for factory-set default values).

To set the default values:

1) Turn the **S**et **V**alues knob until **EXIT** is displayed and press the **S**elect button.
   - **VENT CHECK** is displayed
2) Turn the **S**et **V**alues knob until **VENT OP** is displayed and press the **S**elect button.
3) Turn the **S**et **V**alues knob until **DEFAULTS** is displayed and press the **S**elect button.
   - **SET DEFAULTS** is displayed.
4) Press the **S**elect button while **SET DEFAULTS** is displayed.
   - Except for the Language selected and the Date/Time settings and format, all user settable Controls and Extended Features options are reset to their factory-set default values.
   - A **DEFAULTS SET** alarm will be generated the next time the ventilator is powered up in normal ventilation mode (see ***Alarms, DEFAULTS SET*** for additional information).

Exit

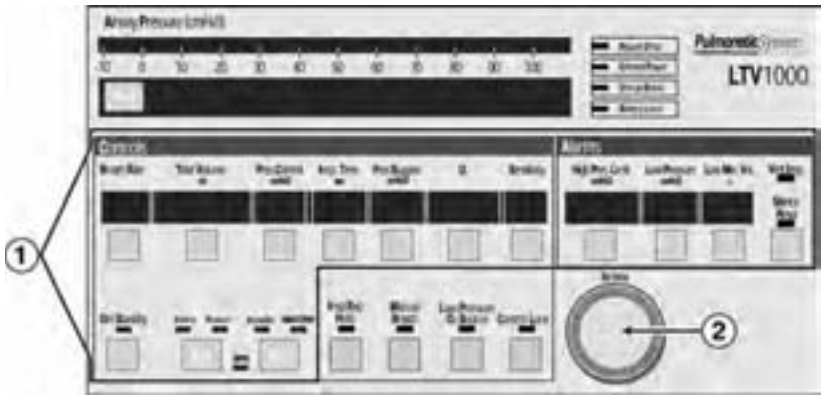
To return to any of the **VENT CHECK** tests, turn the **S**et **V**alue knob until the desired test is displayed.

To Exit:

1) Press the **S**elect button while **EXIT** is displayed, and **VENT CHECK** is displayed.
2) Turn the **S**et **V**alue knob until **EXIT** is displayed again.
3) Press the **S**elect button.

The Ventilator performs a Self Test (POST) and resumes normal operation.

VARIABLE CONTROLS



To set a variable control:

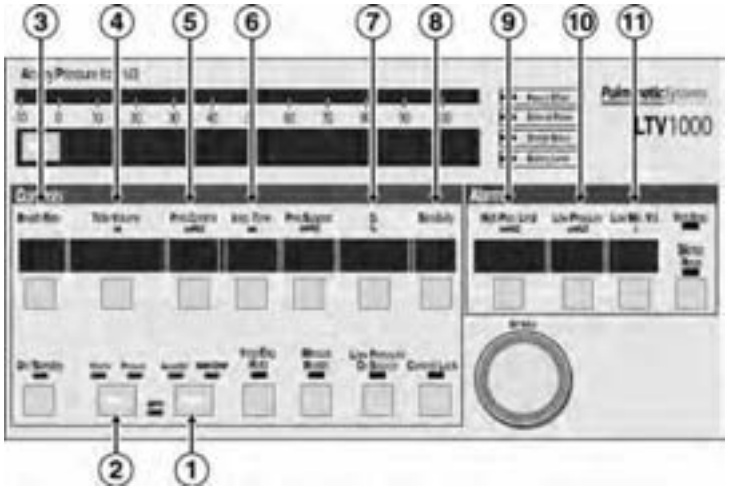
1) Select the control by pressing the associated button. The display for the selected control will be displayed at normal brightness and all other control displays will be dimmed.
2) Change the control value by rotating the **S**et **V**alue Knob. Rotate clockwise to increase and counter-clockwise to decrease the value.

3) The new control value goes into effect when the operator:
   - Presses the selected button again, or
   - Selects another control, or
   - Presses the **C**ontrol **L**ock button, or
   - Waits 5 seconds

   All controls will then return to their normal brightness.

SETTING UP MODES OF VENTILATION

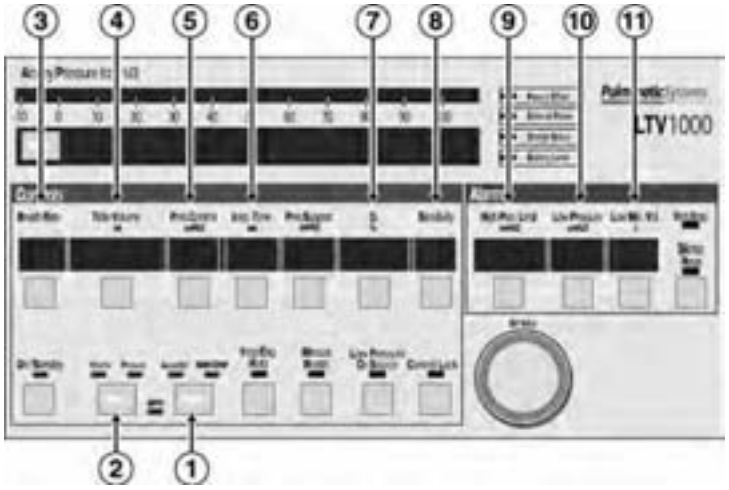
Setting Up Control Mode



To set the ventilator up in Control mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the **A**ssist/**C**ontrol mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900.)
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set O_2% (LTV® 1000 only).
8) Set the Sensitivity to Off (dash "-").
9) Set the High Pressure Limit alarm.
10) Set the Low Pressure alarm.
11) Set the Low Minute Volume alarm.
12) Set the PEEP control on the exhalation valve.

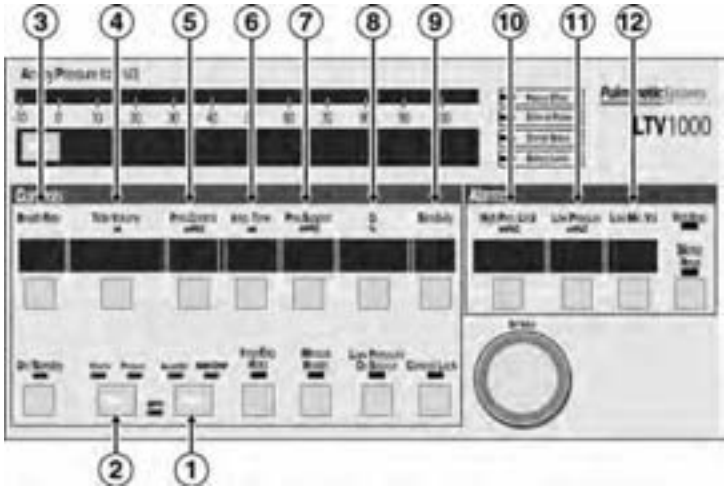
Setting Up Assist/Control Mode



To set the ventilator up in Assist/Control mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the **A**ssist/**C**ontrol mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900).
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set O_2%, (LTV® 1000 only).
8) Set the Sensitivity to a setting from 1 to 9.
9) Set the High Pressure Limit alarm.
10) Set the Low Pressure alarm.
11) Set the Low Minute Volume alarm.
12) Set the PEEP control on the exhalation valve.

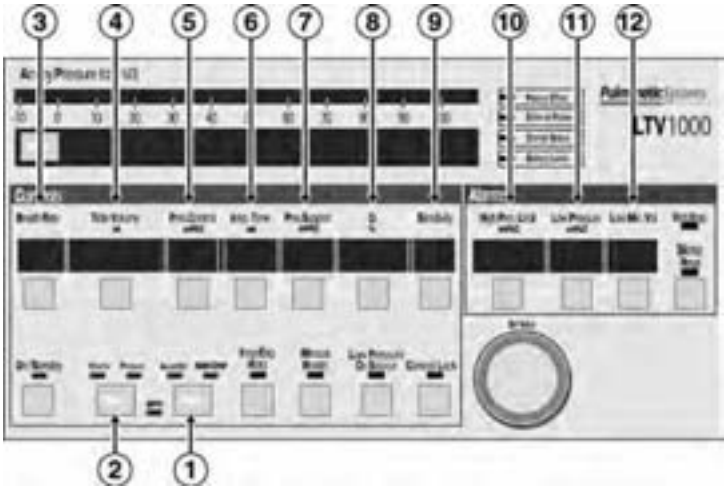
Setting Up SIMV Mode



To set the Ventilator up in SIMV mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the SIMV/CPAP mode.
2) Press the **S**elect button to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900).
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the Pressure Support, if desired.
8) Set O_2% (LTV® 1000 only).
9) Set the Sensitivity to a setting from 1 to 9.
10) Set the High Pressure Limit alarm.
11) Set the Low Pressure alarm.
12) Set the Low Minute Volume alarm.
13) Set the PEEP control on the exhalation valve.

Setting Up CPAP Mode

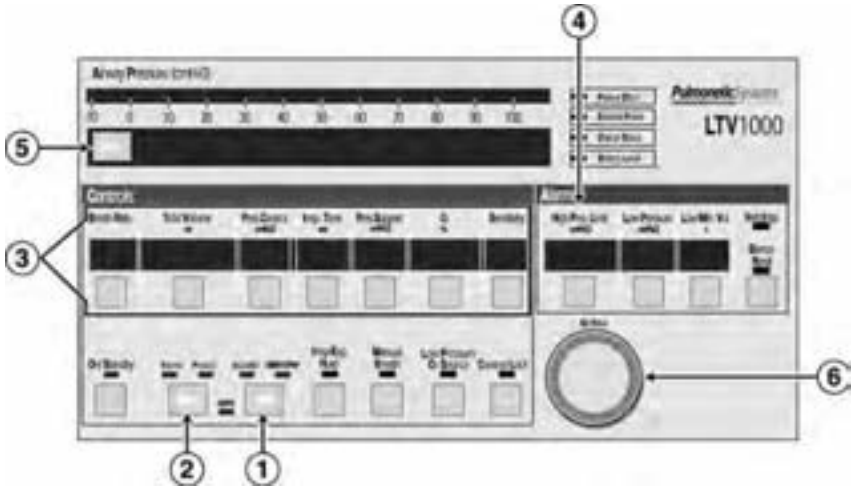


To set the ventilator up in CPAP mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the SIMV/CPAP mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation for Apnea backup. Select **V**olume or **P**ressure for Apnea backup. (Not available on the LTV® 900).
3) Set the Breath Rate to Off (dashes "- -").
4) If Volume ventilation is selected, set the Tidal Volume for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control for Apnea backup. (Not available on the LTV® 900.)
6) Set the Inspiratory Time for Apnea backup. The calculated peak flow Vcalc is displayed in the window while Inspiratory Time is being changed. Vcalc only applies to volume ventilation.
7) Set the Pressure Support, if desired.
8) Set O_2% (LTV® 1000 only).
9) Set the Sensitivity to a setting from 1 to 9.
10) Set the High Pressure Limit alarm.
11) Set the Low Pressure alarm for Apnea backup.
12) Set the Low Minute Volume alarm.
13) Set the PEEP control on the exhalation valve.

NOTE: Although Tidal Volume, Pressure Control and Insp Time are dimmed, they should be set to clinically appropriate levels as the ventilator uses these settings for Apnea back-up ventilation.

Setting Up NPPV Mode



To set the Ventilator up in NPPV mode:

1) Set the ventilator controls for Control, Assist/Control, SIMV, or CPAP mode, as described in the preceding section.
2) Set the ventilator controls for **V**olume or **P**ressure ventilation, as described in the preceding section.
3) Set all other ventilation parameters, as described in the previous section.
4) Set the High Pressure Limit alarm.
5) Enter Extended Features by pressing and holding the Monitor **S**elect button for 3 seconds.
6) Turn the **S**et **V**alue knob until **VENT OP** is displayed.
7) Press the Monitor **S**elect button.
8) Turn the **S**et **V**alue knob until **NPPV Mode** is displayed.
9) Press the Monitor **S**elect button.
10) Turn the **S**et **V**alue knob until **NPPV On** is displayed.
11) Press Monitor **S**elect button.
12) The NPPV LED will be illuminated.
13) Exit the Extended Features menus by turning the **S**et **V**alue knob until **Exit** is displayed, and pressing **S**elect button until monitored data is displayed in the window.

MONITORED DATA

The monitored data displays may be automatically scrolled or manually scrolled. To cycle through the available monitored data automatically from a halted scan, press the Monitor **S**elect button twice. Pressing the **S**elect button once while scan is active shall halt scanning and the currently display monitor shall remain in the display window. Each time you press the button once; the next data item in the list will be displayed. To resume scan, press the scan button twice. The monitored data is displayed in the following order.

Display	Description
PIP	Displays the Peak Inspiratory Pressure measured during the inspiratory phase. PIP is not updated for spontaneous breaths.
MAP	Displays a running average of the airway pressure for the last 60 seconds.
PEEP	Displays the pressure in the airway circuit at the end of exhalation.
f	Displays the breaths per minute and includes all breath types.
Vte	Displays the exhaled tidal volume as measured at the patient wye.

Display	Description
VE	Displays the exhaled tidal volume for the last 60 seconds as calculated from the last 8 breaths.
I:E	Displays the ratio between measured inspiratory time and measured exhalation time. Both normal and inverse I:E Ratios are displayed.
Vcalc	Is based on the Tidal Volume and Inspiratory Time settings. Displayed when selected and whenever Tidal Volume or Inspiratory Time is selected for change.

EXTENDED FEATURES

Navigating the Extended Features Menus:

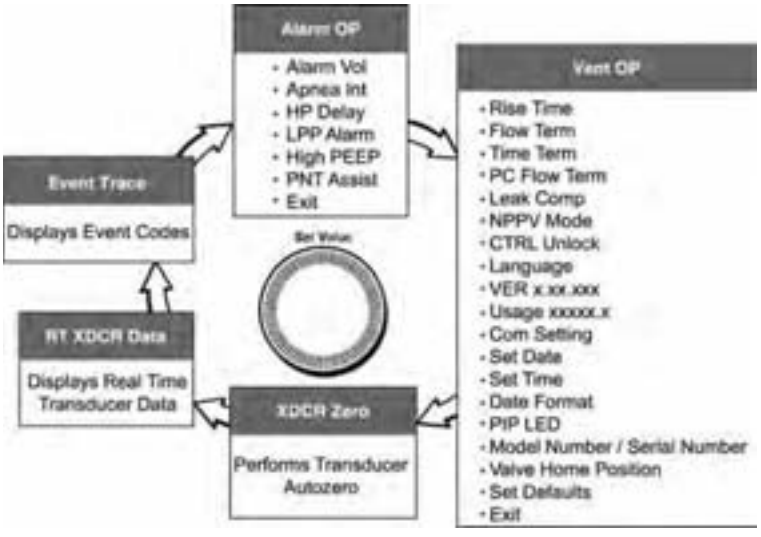
To enter the Extended Features menu (in normal ventilation mode), press and hold the Monitor **S**elect button for three seconds.

To view the next item in a menu, turn the **S**et **V**alue knob clockwise.

To view the previous item, turn the **S**et **V**alue knob counterclockwise.

To enter a menu item or select a setting, press the **S**elect button.

To exit a menu, turn the **S**et **V**alue knob until the **EXIT** option is displayed, then press the **S**elect button or press **C**ontrol **L**ock.



Alarm Operations

Alarm Volume

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed.

1) Press the **S**elect button.

2) **VOL xx dBA** is displayed, where **xx** is the currently set volume.

3) Turn the **S**et **V**alue knob until the desired setting is displayed.

4) Press the **S**elect button.

Alarm Operations

Apnea Interval

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **APNEA INT** is displayed.

1) Press the **S**elect button.

2) **APNEA xx sec** is displayed, where **xx** is the currently set Apnea interval.

3) Turn the **S**et **V**alue knob until the desired setting is displayed.

4) Press the **S**elect button.

Alarm Operations

High Pressure Alarm Delay

This menu item is used to select immediate or delayed audible notification for High Pressure alarms.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **HP DELAY** is displayed.

1) Press the **S**elect button.

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **NO DELAY, DELAY 1 BRTH,** or **DELAY 2 BRTH**.

3) Press the **S**elect button.

Alarm Operations

Low Peak Pressure Alarm

This item is used to select the type of breaths that the Low Pressure Alarm applies to.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **LPP ALARM** is displayed.

1) Press the **S**elect button.

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **ALL BREATHS, VC/PC ONLY**.

3) Press the **S**elect button.

Alarm Operations

High PEEP Alarm[1]

This menu item is used to set a high PEEP alarm value. When the current PEEP value exceeds the set high PEEP alarm value, an audible alarm will be sounded and a flashing **HIGH PEEP** message will be displayed.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **HIGH PEEP** is displayed.

1) Press the **S**elect button.

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **HI PEEP OFF** or **PEEP xx cmH_2O**.
3) Turn the Set Value knob until the desired setting is displayed.

4) Press the Select button.

[1] The HIGH PEEP alarm is only available on ventilators with software version 3.15 or higher installed.

Alarm Operations

PNT Assist[2]

This menu item is used to configure the patient Assist Port output signal to be generated for use with remote alarm systems.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **PNT ASSIST** is displayed.

1) Press the **S**elect button.

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **NORMAL** or **PULSE**.

3) Press the **S**elect button.

[2] The PNT ASSIST option is only available on ventilators with software version 3.15 or higher installed.

Alarm Operations

Exit

To return to the top of the **ALARM OP** menu:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

2) Press the **S**elect button while **EXIT** is displayed

Ventilator Operations

Variable Rise Time

The variable Rise Time option is used to select the rise time profile for Pressure Control and Pressure Support breaths. The rise time profiles are numbered 1 through 9, where 1 is the fastest rise time and 9 is the slowest rise time.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button, and **RISE TIME** is displayed.

1) Press the **S**elect button.

2) **PROFILE x** is displayed, where **x** is the currently set value.

3) Turn the **S**et **V**alue knob until the desired Rise Time Profile is displayed.

4) Press the **S**elect button.

Ventilator Operations

Variable Flow Termination

The Variable Flow Termination is used to select the percentage of peak flow used for cycling Pressure Support breaths. Pressure Support breaths are cycled from inspiration to exhalation when the flow reaches the set percentage of the peak flow, or when flow goes below 2 lpm.

When Pressure Control Flow Termination is enabled, the Variable Flow Termination setting is used for flow termination of Pressure Control breaths as well.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **FLOW TERM** is displayed.
2) Press the **S**elect button.
3) **% OF PEAK xx** is displayed, where **xx** is the current Flow Termination setting.
4) Turn the **S**et **V**alue knob until the desired Flow Termination percentage is displayed.
5) Press the **S**elect button.

Ventilator Operations

Variable Time Termination

The Variable Time Termination is used to select maximum inspiratory time for cycling Pressure Support breaths. Pressure Support breaths are cycled from inspiration to exhalation, if this time is reached before the flow reaches the set percentage of the peak flow. When a breath is cycled based on the time setting, the Pressure Support display is flashed briefly.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **TIME TERM** is displayed.
2) Press the **S**elect button.
3) **TERM x.x sec** is displayed, where **xx** is the current Time Termination setting.
4) Turn the **S**et **V**alue knob until the desired Time Termination is displayed.
5) Press the **S**elect button.

Ventilator Operations

Pressure Control Flow Termination

The Pressure Control Flow Termination option is used to enable or disable flow termination for Pressure Control breaths.

When this option is on, Pressure Control breaths are cycled at the set percentage of peak flow, if it is reached before the set Inspiratory Time elapses. The percentage of peak flow is set in the Variable Flow Termination option.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **PC FLOW TERM** is displayed.
2) Press the **S**elect button.

3) **PC FLOW ON** or **PC FLOW OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired state is displayed.
5) Press the **S**elect button.

Ventilator Operations

Leak Compensation

Use the Leak Compensation option to enable or disable tracking of the Baseline Flow to improve triggering when a circuit leak is present.

When Leak Compensation is on, the system is gradually adjusted to maintain set sensitivity, if the leak is stable and there is no auto cycling.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **LEAK COMP** is displayed.
2) Press the **S**elect button.

3) **LEAK COMP ON** or **LEAK COMP OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired state is displayed.
5) Press the **S**elect button.

Ventilator Operations

NPPV Mode

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until the **NPPV MODE** is displayed.
2) Press the **S**elect button.
3) **NPPV MODE ON** or **NPPV MODE OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired state is displayed.
5) Press the **S**elect button.

Ventilator Operations

Control Unlock

When the Easy method is selected, unlock the controls by pressing and releasing the **C**ontrol **L**ock button.

When the Hard method is selected, unlock the controls by pressing and holding the **C**ontrol **L**ock button for 3 seconds.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **CTRL UNLOCK** is displayed.
2) Press the **S**elect button.
3) **UNLOCK EASY** or **UNLOCK HARD** is displayed.
4) Turn the **S**et **V**alue knob until the desired setting is displayed.
5) Press the **S**elect button.

Ventilator Operations

Language Selection

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **LANGUAGE** is displayed.

2) Press the **S**elect button.

3) **ENGLISH** or the currently selected language is displayed.

4) Turn the **S**et **V**alue knob until the desired language is displayed.

5) Press the **S**elect button.

Ventilator Operations

Software Versions

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button. Turn the **S**et **V**alue knob until **VER xx.xx.xx** is displayed, where **xx.xx.xx** is the current software version.

Usage Meter

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button. Turn the **S**et **V**alue knob until **USAGE xxxxx.x** is displayed, where **xxxxx.x** is the current number of hours the ventilator has been in operation.

Ventilator Operations

Communications Setting

The ventilator may be connected to printer, a graphics monitor, or a modem. The Communications Setting option is used to select the communications protocol for data transmission.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **COM SETTING** is displayed.

2) Press the **S**elect button.

3) **MONITOR** or the currently selected protocol is displayed.
4) Turn the **S**et **V**alue knob until the desired protocol is displayed.

5) Press the **S**elect button.

Ventilator Operations

Set Date

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **SET DATE** is displayed.

2) Press the **S**elect button.

3) The current date is displayed in the currently selected date format.
4) Press the **C**ontrol **L**ock button to exit, or continue to modify the Date.

To modify the Date:

1) Press the **S**elect button, **YEAR xxxx** is displayed.

2) Turn the **S**et **V**alue knob until the desired year is displayed.

3) Press the **S**elect button, **MONTH xx** is displayed.
4) Turn the **S**et **V**alue knob until the desired month is displayed.
5) Press the **S**elect button, **DAY xx** is displayed.
6) Turn the **S**et **V**alue knob until the desired day is displayed.
7) Press the **S**elect button to accept the new date.

Ventilator Operations

Set Time

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **SET TIME** is displayed.

2) Press the **S**elect button.

3) The current time is displayed.
4) Press the **C**ontrol **L**ock button to exit, or

To modify the Time:

1) Press the **S**elect button, **HOUR xx** is displayed.

2) Turn the **S**et **V**alue knob until the desired hour is displayed.

3) Press the **S**elect button, **MIN xx** is displayed.
4) Turn the **S**et **V**alue knob until the desired minute is displayed.
5) Press the **S**elect button to accept the new time. The seconds are automatically reset to **00**.

Ventilator Operations

Date Format

The Date Format option is used to select the display format for the current date.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **DATE FORMAT** is displayed.

2) Press the **S**elect button.

3) **MM/DD/YYYY** or the currently selected date format is displayed.
4) Turn the **S**et **V**alue knob until the desired format is displayed.

5) Press the **S**elect button.

Ventilator Operations

PIP LED

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **PIP LED** is displayed.

2) Press the **S**elect button.

3) **PIP LED ON** or **PIP LED OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired setting is displayed.

5) Press the **S**elect button.

Ventilator Operations

Model Number / Serial Number

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

To view the LTV® model number:

Turn the **S**et **V**alue knob until **LTV XXXX** is displayed, where **XXXX** is the model of the ventilator.

To view the LTV® serial number:

1) Press the **S**elect button while **LTV XXXX** is displayed.

   - The serial number is displayed on the left side of the display area as **XXXXXX**, where **XXXXXX** is the serial number of the ventilator.
2) Press the **S**elect button to return to the model number option.

To view LTM™ compatibility:

1) Press the **S**elect button while **LTV XXXX** is displayed.

   - **LTM** will be displayed if software and internal hardware in the LTV® Ventilator are LTM™ compatible.
2) Press the **S**elect button to return to the model number.

Ventilator Operations

Valve Home Position

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

To view the valve home position:

Turn the **S**et **V**alue knob until **Vhome XXX** is displayed, where **XXX** is the home position for the flow valve installed in the ventilator.

Set Defaults

The Set Defaults option is only displayed and accessed through the **VENT CHECK** and **VENT MTNCE** menus and is used to reset user settable Controls and Extended Features settings to their factory-set default values. See *Ventilator Checkout Tests, Set Defaults* for instructions on how to set default values and the *LTV® Series Ventilators Operator's Manual* for factory-set default values.

Ventilator Operations

Exit

To return to the top of the VENT OP menu:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

2) Press the **S**elect button.

XDCR ZERO

This item is used to view the Transducer Autozero results and schedule the Transducer Autozero to be run (please refer to the Operator's Manual).

Ventilator Operations

RT XDCR DATA

This menu displays the Real Time Transducer Data (please see the Service Manual for more information).

EVENT TRACE

This menu displays the Events Codes stored by the ventilator (please see the Service Manual for more information).

Ventilator Operations

Exiting Extended Features

To return to Monitored Parameters:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

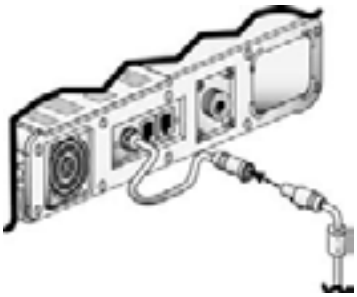
2) Press the **S**elect button.

3) Repeat Steps 1 and 2 until the Monitored Parameters are displayed.

USING AC/DC POWER

Using the AC Adapter

To run the ventilator from an external AC power source.



1) Connect the power jack (straight or 90°) from the AC adapter to the power port (earlier version ventilators) or power port pigtail connector (current version ventilators) on the left side of the ventilator.
2) Connect the proper AC power cable (110 or 220 V plug) to the AC power adapter.
3) Connect the 110 or 220 V power cable to a suitable power source.

While the ventilator is plugged in, the internal battery is continuously charged.

CAUTION: Release Button – To avoid damaging the ventilator or the power connector, press the release button on the connector before removing it from the ventilator power port pigtail connector.

Using an External DC Power Source

To run the ventilator from an external DC power source.

1) Connect the power port of the external DC power adapter cable to the power port on the left side of the ventilator (earlier version ventilators), or the power port pigtail connector (current version ventilators).
2) Connect the DC jack to the DC power source.

POWER DISPLAYS AND INDICATORS

Indicators

Battery Level

The Battery Level indicator shows the level of available internal battery power while running from the internal battery.

LED Color	Battery Level	Approximate Battery Time @ nominal settings
Green	Internal battery level is acceptable	45 minutes
Amber	Internal battery level is low	10 minutes
Red	Internal battery level is critically low	5 minutes
Off	Ventilator is running on AC or External Battery	

Indicators

Charge Status

When the ventilator is plugged into an External Power source, it automatically charges the internal battery.

LED Color	Charge Status
Flashing Amber	The ventilator is performing pre-charge qualification testing of the battery prior to starting the charge process. This happens when external power is first applied to the ventilator. The qualification process normally takes a few seconds but may take up to an hour on a deeply discharged battery.
Green	The internal battery is charged to full level.
Amber	The battery has not reached a full charge level and is still charging.
Red	The ventilator has detected a charge fault or internal battery fault. The internal battery cannot be charged. Contact your Pulmonetic Systems Certified Service Technician.

Indicators

External Power

The External Power indicator shows the level of external power while the ventilator is operating from an external power source. When the ventilator is running from the internal battery, the External Power indicator is off. When running from external power, the indicator shows the following levels.

LED Color	Power Level
Green	External Power level is acceptable
Amber	External Power level is low

External power may be provided by connecting the ventilator to an external battery or to an external AC power source.

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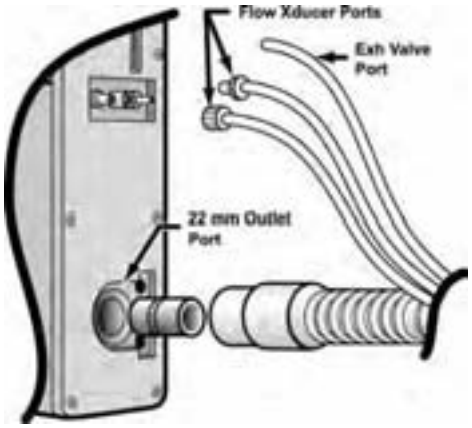
ATTACHING A BREATHING CIRCUIT

How to attach a patient breathing circuit.

1) Connect the main breathing tube to the 22 mm outlet port on the right side of the ventilator.
2) Connect the two exhalation flow transducer sense lines to the ports marked **Flow Xducer** on the right side of the ventilator. These are non-interchangeable Luer fittings.
3) Connect the Exhalation Valve driver line to the port marked **Exh Valve** on the right side of the ventilator.



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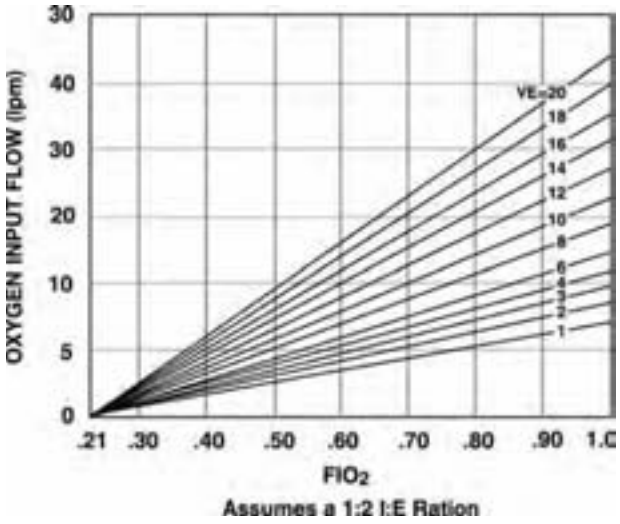
OXYGEN COMPUTER CHART



Oxygen Computer Chart

To determine O2 Input Flow:

1) Find the desired FIO_2 on the horizontal axis.
2) Project up to the minute volume.
3) Project horizontally to the left vertical axis and read the oxygen flow.

To determine O_2 Concentration:

1) Find the O_2 input flow on the vertical axis.
2) Project horizontally right to the minute volume.
3) Project vertically down to the horizontal axis and read the FIO_2.

ALARMS

How to Silence and Reset Alarms

To silence an alarm, press the **S**ilence **R**eset button.
To reset an alarm that has been corrected, press the **S**ilence **R**eset button again.

Alarm	Cause	Solution
APNEA XX bpm	Occurs when the time since the last breath start exceeds the set Apnea Interval. When an Apnea alarm occurs, the ventilator will enter Apnea Back up ventilation mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.
APNEA	An Apnea alarm has occurred and cleared The ventilator is no longer in Apnea Back-up mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.

Alarm	Cause	Solution
BAT EMPTY	Occurs when the ventilator is operating from the internal battery power and the batter charge level is critically low. This alarm can be temporarily silenced but cannot be cleared.	Attach the ventilator to external AC or DC power.
BATTERY LOW	Occurs when the ventilator is operating from internal battery power and the battery charge level is low.	Attach the ventilator to external AC or DC power. Reevaluate power requirements.
DEFAULTS	Occurs during POST when the ventilator detects an invalid setting stored in non-volatile memory.	Push the **S**ilence/**R**eset button twice to reset alarm. Reevaluate ventilator settings.
DEFAULTS SET	Occurs when the ventilator is first powered up after the **SET DEFAULTS** option has been used to reset all controls and extended features settings to their factory-set default values.	Push the **S**ilence/**R**eset button twice to reset alarm. Reevaluate ventilator settings.

Alarm	Cause	Solution
DISC/SENSE	Occurs when the ventilator detects one of the following conditions: • The patient circuit or proximal pressure sense line has become disconnected. • The low side exhalation flow transducer sense line has become disconnected. • The proximal pressure sense line is pinched or occluded.	Check Patient Circuit assembly for disconnects. Check pressure sensing lines for occlusions.
HIGH O_2 PRES	Occurs when the average oxygen inlet pressure exceeds the acceptable limit for the type of oxygen source.	Reduce O_2 inlet pressure.

Alarm	Cause	Solution
HIGH PEEP[3]	Occurs when the ventilator detects one of the following conditions: • The patient circuit positive end expiratory pressure (PEEP) exceeds the High PEEP alarm setting. • Patient Circuit, Exhalation valve and/or PEEP valve occluded.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
HIGH PRES	Occurs when the circuit pressure exceeds the set High Pressure Limit setting.	Reevaluate ventilator settings. Inspect Patient Circuit for occlusions or kinks. Reevaluate patient.
HW Fault	Occurs when the ventilator detects a problem with the ventilator hardware.	If alarm reoccurs, contact your Service Rep or Pulmonetic Systems.

[3] The **HIGH PEEP** alarm is only available on ventilators with software version 3.15 or higher installed.

Alarm	Cause	Solution
INOP 	A ventilator INOP occurs when: • The ventilator is switched from On to Standby. • The ventilator detects any condition that is deemed to make the ventilator unsafe.	If an INOP alarm occurs during operation, remove ventilator from service and contact your Service Rep.
LOCKED	The **LOCKED** message is displayed when a button is pressed while the controls are locked. No audible alarm is given.	Press the **C**ontrol **L**ock button. If locked alert continues, press and hold the **C**ontrol **L**ock button for three seconds.
LOW MIN VOL	Occurs when the exhaled minute volume is less than the set Low Minute Volume.	Examine Exhalation Valve body for disconnects. Reevaluate patient.

Alarm	Cause	Solution
LOW O_2 PRES	Occurs when the average oxygen inlet pressure is less than the minimum acceptable inlet pressure of 35 PSIG.	Increase O_2 inlet pressure. If using O_2 cylinder, replace used cylinder with a new one.
LOW PRES	Occurs when the peak inspiratory pressure for a machine or assist breath is less than the Low Pressure setting.	Examine Patient Circuit for disconnect. Reevaluate ventilator settings. Reevaluate patient.
NO CAL DATA, NO CAL	Occurs when the ventilator detects invalid or missing calibration records on power up.	Remove ventilator from service, perform Calibration procedure.
POWER LOST	Occurs when the ventilator is operating on external power and the voltage drops below the useable level and switches to internal battery operation.	Evaluate power requirements. Attach ventilator to an external AC or DC power source.

Alarm	Cause	Solution
POWER LOW	Occurs when the ventilator is operating on external power and the voltage drops to the low level.	Evaluate power requirements.
REMOVE PTNT	Occurs when the ventilator is powered up in the Ventilator Checkout or Ventilator Maintenance modes. The ventilator is not delivering gas.	Ensure patient is disconnected from ventilator and is being ventilated by alternative means.
RESET	A **RESET** alarm occurs if the ventilator restarts following a condition other than being shut down by pressing the On/Standby button.	May be caused by Internal Battery depletion during operation[4] or ESD. If the problem reoccurs, remove from service and contact your Service Rep or Pulmonetic Systems

[4] Only available on ventilators with software version 3.13 or higher installed.

Alarm	Cause	Solution
XDCR FAULT	Occurs when a transducer autozero test fails.	Press **S**ilence/**R**eset button twice to reset alarm. If problem occurs frequently, remove from service and contact your Service Rep. or Pulmonetic Systems.

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Appendix C
Quick Reference Guide for LTV® 1200/1150 Series Ventilators

Appendix C
Quick Reference Guide for LTV® 1200/1150 Series Ventilators

Notes

ASSISTANCE

Cardinal Health
Pulmonetic Systems
17400 Medina Rd., Suite 100
Minneapolis, Minnesota 55447-1341

Customer Care: (800) 754-1914
(763) 398-8500
Fax: (763) 398-8403
Website: www.cardinalhealth.com/viasys

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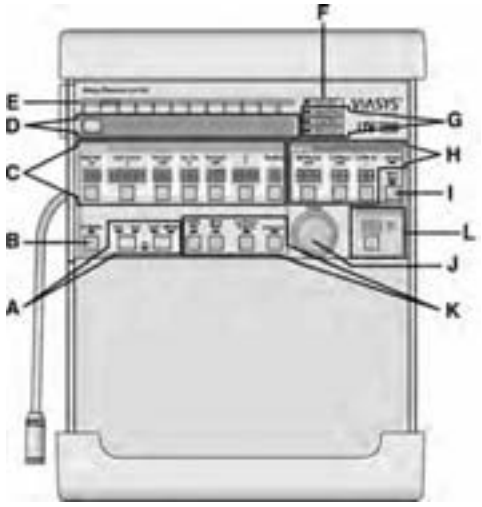
FRONT AND SIDE PANEL REFERENCE

Front Panel Display and Description (LTV® 1200 shown)



A - **Mode and Breath Selection** – Selects ventilation modes, and selects breath types.

B - **On/Standby Button** – Turns the ventilator “On” or to “Standby”.

C - **Variable Control Settings** – Sets and displays each ventilation characteristic.

D - **Display Window** – Displays Alarm Messages, Monitored Data, and Extended Features menus.

E - **Airway Pressure Display** – Displays real-time airway circuit pressure.

F - **Patient Effort Indicator** – LED is lit briefly each time a patient trigger is detected.

G - **Power Source** – Displays power source and charge levels.

H - **Variable Alarm Settings** – Sets and displays variable alarm levels.

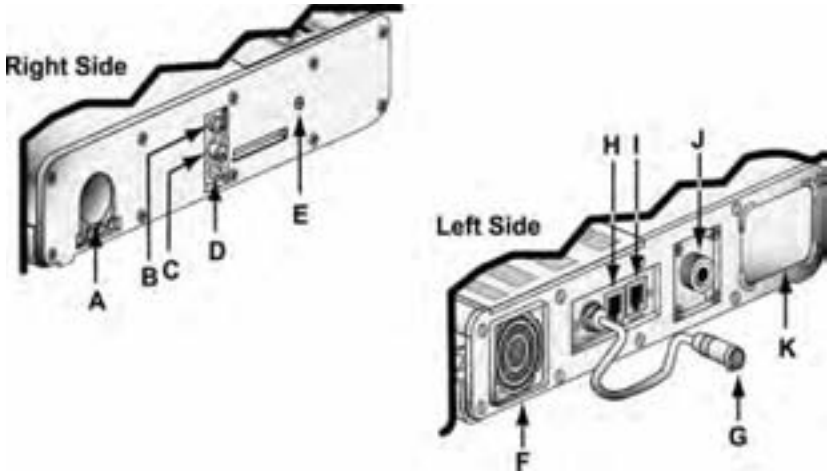
I - **Alarm Silence/Reset** – Silences audible alarms. Clears visual alarms.

J - **Set Value Knob** – Changes variable control settings. Navigates Extended Features.

K - **Special Controls** – Activates special controls such as Manual Breath, Low Pressure O_2 Source (LTV® 1200 only), Insp/Exp Hold and Control Lock feature.

L - **PEEP** – PEEP control setting and display.

Side Panel Descriptions



A - **22mm Outlet Port** – Patient Breathing Circuit outlet port.
B - **Flow Xducer** – Flow Transducer high pressure sensing port.
C - **Flow Xducer** – Flow Transducer low pressure sensing port.
D - **Exh Valve** – Exhalation Valve drive line port.
E - **Alarm Sounder Port**
F - **Cooling Fan**
G - **DC Input** – DC power port pigtail connector.
H - **Patient Assist** – Patient Assist Call jack.
I - **Comm Port** – Communications port.
J - **O_2 Inlet** – Oxygen Inlet fitting.
K - **Filter** – Air Inlet.

TURNING THE VENTILATOR ON AND OFF

Turning the Ventilator On

1) Push the **On/Standby** button.

If the Patient Query feature is enabled/on when the ventilator is powered up, ventilation and alarm activation are suspended and the message **SAME PATIENT** is displayed.

- To enable the suspended alarms and begin ventilation with the settings in use during the last power cycle, press the **Select** button while **SAME PATIENT** is displayed.
- To enable the suspended alarms and begin ventilation with Preset values appropriate for a new patient, turn the **Set Value** knob until **NEW PATIENT** is displayed and press the **Select** button. Then turn the **Set Value** knob until the desired patient type is displayed (**INFANT, PEDIATRIC** or **ADULT**) and press the **Select** button (see the *LTV® 1200 or LTV® 1150 Operator's Manual,* Chapter 10, for detailed settings and information).

If the Patient Query feature is disabled/off when the ventilator is powered up and passes POST, it will begin ventilation (appropriate alarms enabled) using the settings in use during the last power cycle.

Turning the Ventilator Off

To turn the ventilator off:

1) **Disconnect the patient from the ventilator**.

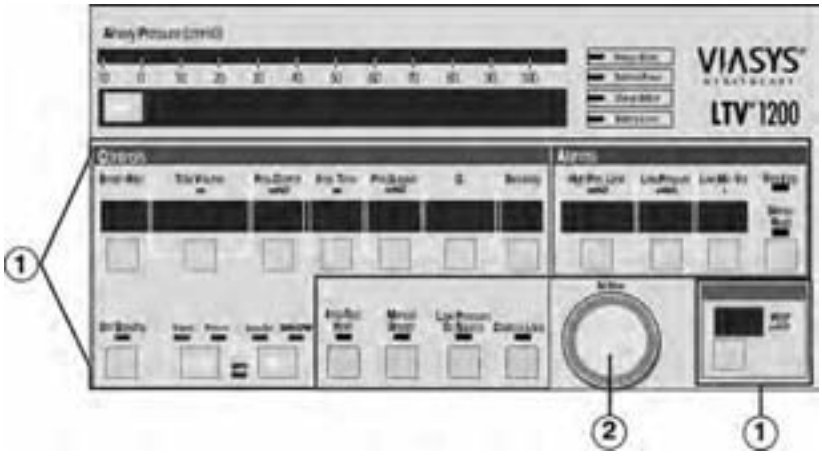
2) Press and hold the **On/Standby** button for 3 seconds. The ventilator ceases operating, the audible alarm sounds continuously and the **Vent Inop** LED is lit.

3) Press the **Silence/Reset** button to silence the audible alarm.
   - Verify a confirming audible chirp is activated immediately after the alarm is silenced.

4) The ventilator continues to charge the internal battery as long as it is connected to an external power source.

   Note: The **Vent Inop** LED will remain lit for a minimum of 5 minutes and does not impact battery life.

VARIABLE CONTROLS



To set a variable control:

1) Select the control by pressing the associated button. The display for the selected control will be displayed at normal brightness and all other control displays will be dimmed.

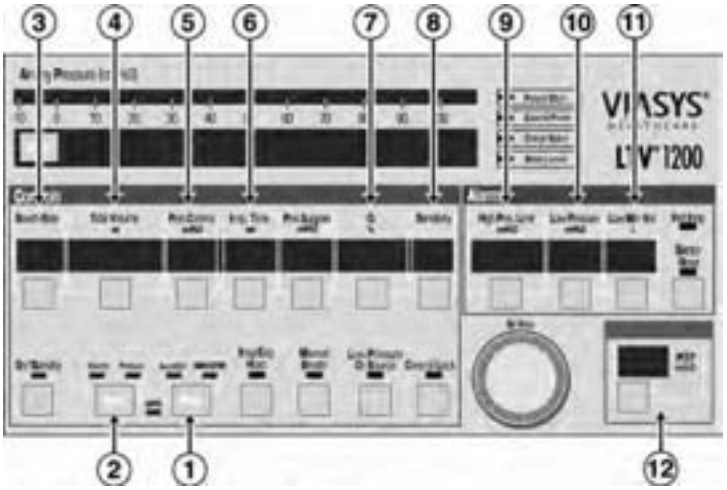
2) Change the control value by rotating the **Set Value** Knob. Rotate clockwise to increase and counter-clockwise to decrease the value.

3) The new control value goes into effect when the operator:
   - Presses the selected button again, or
   - Selects another control, or
   - Presses the **Control Lock** button, or
   - Waits 5 seconds

   All controls will then return to their normal brightness.

SETTING UP MODES OF VENTILATION

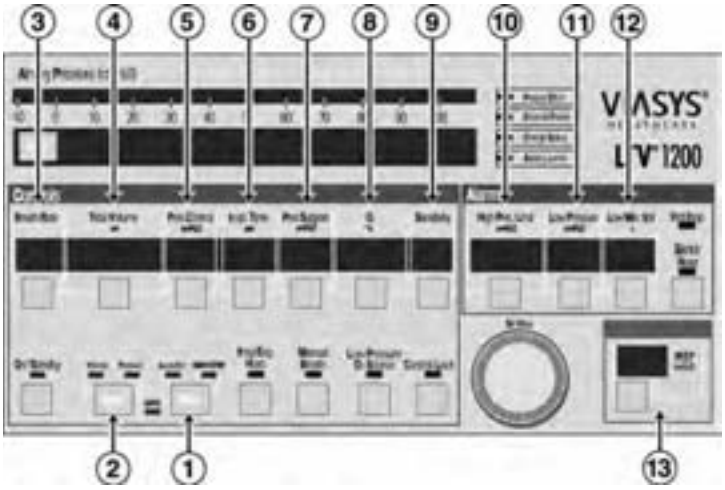
Setting Up Assist/Control Mode



Setting Up the Ventilator in Assist/Control Mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **Assist/Control** mode.
2) Press the **Select** button twice to toggle between **Volume** and **Pressure** ventilation. Select **Volume** or **Pressure**, as desired.
3) Set the **Breath Rate**.
4) If **Volume** ventilation is selected, set the **Tidal Volume**. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control**.
6) Set the **Inspiratory Time**. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set **O_2%** (LTV® 1200 only).
8) Set the **Sensitivity** to a setting from 1 to 9.
9) Set the **High Pres. Limit** alarm.
10) Set the **Low Pressure** alarm.
11) Set the **Low Min. Vol.** alarm.
12) Adjust the **PEEP** control.

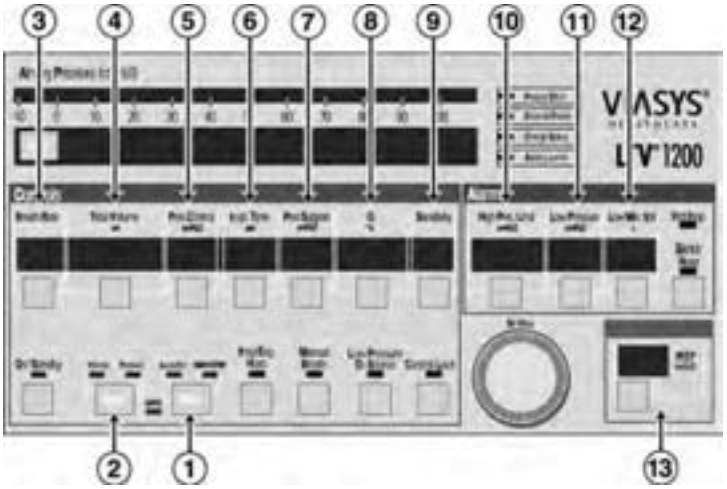
Setting Up SIMV Mode



To set the Ventilator up in SIMV mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **SIMV/CPAP** mode.
2) Press the **Select** button to toggle between **Volume** and **Pressure** ventilation. Select **Volume** or **Pressure**, as desired.
3) Set the **Breath Rate**.
4) If **Volume** ventilation is selected, set the **Tidal Volume**. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control**.
6) Set the **Inspiratory Time**. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the **Pressure Support**, if desired.
8) Set **O_2%** (LTV® 1200 only).
9) Set the **Sensitivity** to a setting from 1 to 9.
10) Set the **High Pres. Limit** alarm.
11) Set the **Low Pressure** alarm.
12) Set the **Low Min. Vol.** alarm.
13) Adjust the **PEEP** control.

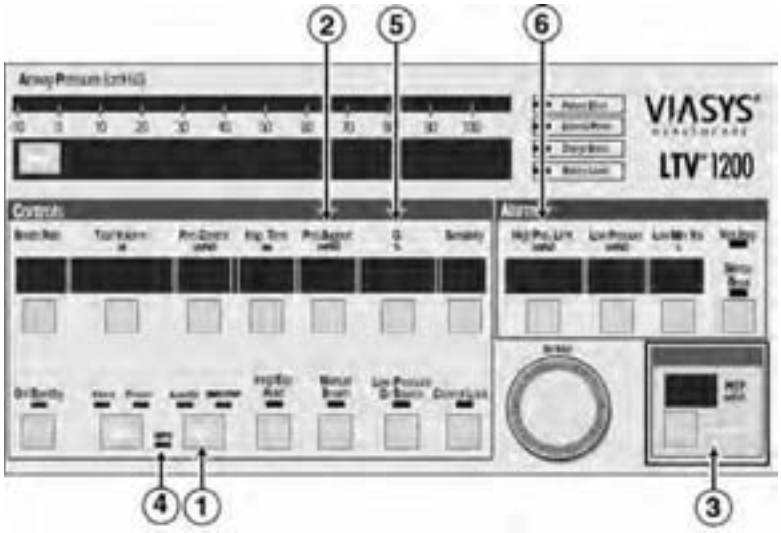
Setting Up CPAP Mode



To set the ventilator up in CPAP mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **SIMV/CPAP** mode.
2) Press the **Select** button twice to toggle between **Volume** and **Pressure** ventilation for Apnea backup. Select **Volume** or **Pressure** for Apnea backup.
3) Set the **Breath Rate** to Off (dashes "**- -**").
4) If **Volume** ventilation is selected, set the **Tidal Volume** for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control** for Apnea backup.
6) Set the **Inspiratory Time** for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the **Pressure Support**, if desired.
8) Set **O_2%** (LTV® 1200 only).
9) Set the **Sensitivity** to a setting from 1 to 9.
10) Set the **High Pres. Limit** alarm.
11) Set the **Low Pressure** alarm for Apnea backup.
12) Set the **Low Min. Vol.** alarm.
13) Adjust the **PEEP** control.

Setting Up NPPV Mode



To set the Ventilator up in NPPV mode:

Set any desired Extended Features options and:

1) Push the **Assist/Control**, **SIMV/CPAP** mode button until the **NPPV** LED flashes. Press the button once more to confirm. The **NPPV** LED continues to flash and **SET IPAP** displays. The **Pres. Support** control display is bright and all other controls dim.
2) Turn the **Set Value** knob to adjust the IPAP value (shown in **Pres. Support** LED window). Press the **Pres. Support** button to confirm, **SET EPAP** will display. The **PEEP** control display is bright and all other controls are dim.
3) Turn the **Set Value** knob to adjust the EPAP value (shown in the **PEEP** LED window). Press the **PEEP** button to confirm.
4) The **PEEP** button push confirms **NPPV** operation and LED then turns solid.
5) Set **O_2%** (LTV® 1200 only).
6) Set the **High Pres. Limit** alarm.

MONITORED DATA

The monitored data displays may be automatically scrolled or manually scrolled. To cycle through the available monitored data automatically from a halted scan, press the Monitor **Select** button (left of display window) twice. Pressing the **Select** button once while scan is active shall halt scanning and the currently display monitor shall remain in the display window. Each time you press the button once; the next data item in the list will be displayed. To resume scan, press the **Select** button twice within 0.3 seconds. The monitored data is displayed in the following order:

Display	Description
PIP	Displays the Peak Inspiratory Pressure measured during the inspiratory phase. PIP is not updated for spontaneous breaths.
MAP	Displays a running average of the airway pressure for the last 60 seconds.
PEEP	Displays the pressure in the airway circuit at the end of exhalation.
f	Displays the breaths per minute and includes all breath types.
Vte	Displays the exhaled tidal volume as measured at the patient wye.
VE	Displays the exhaled tidal volume for the last 60 seconds as calculated from the last 8 breaths.

Display	Description
I:E	Displays the ratio between measured inspiratory time and measured exhalation time. Both normal and inverse I:E Ratios are displayed.
I:Ecalc	Displays the ratio between the set Breath Rate and Inspiratory Time. The display is updated in real-time while the Breath Rate setting is being changed.
Vcalc	Is based on the Tidal Volume and Inspiratory Time settings. Displayed when selected and whenever Tidal Volume or Inspiratory Time is selected for change.
SBT min	Displays the time remaining until the number of minutes preset in the SBT OP, MINUTES menu have elapsed. (Only displayed in the SBT mode of ventilation.)
f/Vt f	f/Vt is computed every time the Total Breath Rate (f) or Total Minute Volume (VE) is calculated. (Only displayed when SBT mode is selected.)

EXTENDED FEATURES

Navigating the Extended Features Menus:

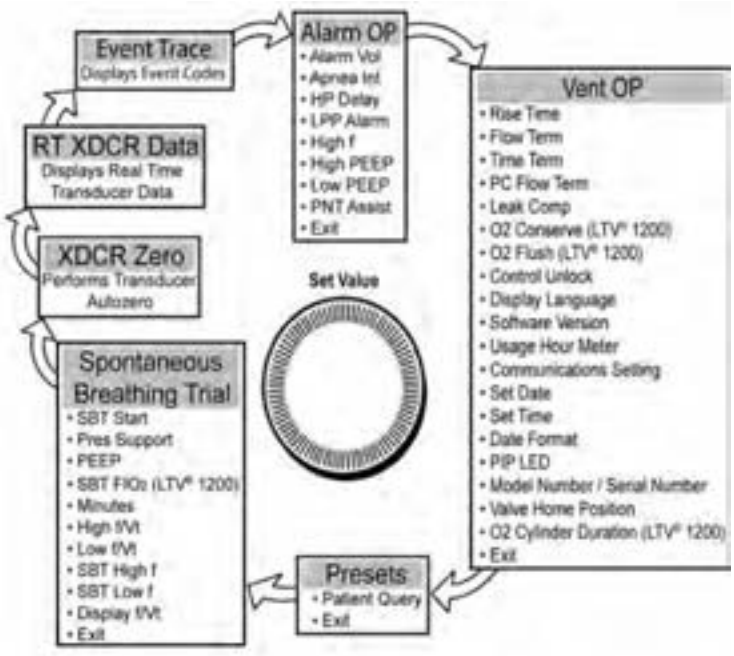
To enter the Extended Features menu (in normal ventilation mode), press and hold the Monitor **Select** button for three seconds.

To view the next item in a menu, turn the **Set Value** knob clockwise.

To view the previous item, turn the **Set Value** knob counterclockwise.

To enter a menu item or select a setting, press the **Select button**.

To exit a menu, turn the **Set Value** knob until the **EXIT** option is displayed, then press the Select button or press **Control Lock**.



SBT (Spontaneous Breathing Trial)

Using the Spontaneous Breathing Trial option you can temporarily minimize ventilatory support and perform clinical assessments of a patient's dependence on, or ability to be removed from positive pressure ventilation. SBT mode should be used only while attended by a Respiratory Therapist or other properly trained and qualified personnel (please refer to the *LTV® 1200 or LTV® 1150 Operator's Manual*, Chapter 10, for more information).

When the Spontaneous Breathing Trial mode is turned on (**SBT ON** selected);

- The ventilator switches to CPAP mode.
- Pressure Support and F_{iO_2} control settings on the front panel are overridden with the values preset in the SBT OP menus.
- The High Breath Rate alarm (**HIGH f**) in the **ALARM OP** menu is disabled (as long as the SBT mode is on).

SBT (Spontaneous Breathing Trial)

To modify the Spontaneous Breathing Trial settings:

1) Turn the **Set Value** knob until **SBT START** is displayed, push the **Select** button, and **SBT OFF** or **SBT ON** is displayed. Turn the **Set Value** knob until the desired setting is displayed, and push the **Select** button.

- When **SBT ON** is selected, the Spontaneous Breathing Trial ventilation mode is turned on using the current SBT menu settings. If the SBT menu settings were not previously reset, the factory set default settings will be used. **<u>All</u> SBT menu settings are to be reviewed for applicability and/or set as necessary, <u>prior</u> to selecting the SBT ON menu option.**
- When the Spontaneous Breathing Trial ventilation mode is active and **SBT OFF** is selected, the Spontaneous Breathing Trial ventilation mode is terminated and ventilation returns to the previously set modes/settings.

SBT (Spontaneous Breathing Trial)

2) **SBT Menu Options**

SBT OP
- **SBT START**
- **PRES SUPPORT**
- **PEEP**
- **SBT FIO2** (LTV® 1200 only)
- **MINUTES**
- **HIGH f/Vt**
- **LOW f/Vt**
- **SBT HIGH f**
- **SBT LOW f**
- **DISPLAY f/Vt**
- **EXIT**

Turn the **Set Value** knob until desired SBT menu option is displayed, push the **Select** button and the value setting is displayed.

Turn the **Set Value** knob until the desired setting is displayed, push the **Select** button, and the desired value is set.

EXTENDED FEATURES

Exiting Extended Features

To return to Monitored Parameters:

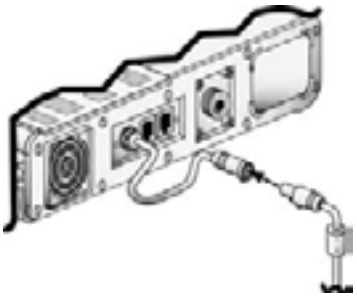
1) Turn the **Set Value** knob until **EXIT** is displayed.

2) Press the **Select** button.

3) Repeat Steps 1 and 2 until the Monitored Parameters are displayed.

USING AC/DC POWER

Using the AC Adapter



To run the ventilator from an external AC power source.

1) Connect the power jack (straight or 90°) from the AC adapter to the power port pigtail connector on the left side of the ventilator.
2) Connect the proper AC power cable (110 or 220 V plug) to the AC power adapter.
3) Connect the 110 or 220 V power cable to a suitable power source.

While the ventilator is plugged in, the internal battery is continuously charged.

CAUTION: Release Button – To avoid damaging the ventilator or the power connector, press the release button on the connector before removing it from the ventilator power port pigtail connector.

Using an External DC Power Source

To run the ventilator from an external DC power source.

1) Connect the power port of the external DC power adapter cable to the power port pigtail connector on the left side of the ventilator.
2) If applicable, connect the DC jack to the DC power source.

POWER DISPLAYS AND INDICATORS

Indicators

Battery Level

The Battery Level indicator shows the level of available internal battery power while running from the internal battery.

LED Color	Battery Level	Approximate Battery Time @ nominal settings
Green	Internal battery level is acceptable	45 minutes
Amber	Internal battery level is low	10 minutes
Red	Internal battery level is critically low	5 minutes
Off	Ventilator is running on AC or External Battery	

Indicators

Charge Status

When the ventilator is plugged into an External Power source, it automatically charges the internal battery.

LED Color	Charge Status
Flashing Amber	The ventilator is performing pre-charge qualification testing of the battery prior to starting the charge process. This happens when external power is first applied to the ventilator. The qualification process normally takes a few seconds but may take up to an hour on a deeply discharged battery.
Green	The internal battery is charged to full level.
Amber	The battery has not reached a full charge level and is still charging.
Red	The ventilator has detected a charge fault or internal battery fault. The internal battery cannot be charged. Contact a Pulmonetic Systems Certified Service Technician.

POWER DISPLAYS AND INDICATORS

Indicators

External Power

The External Power indicator shows the level of external power while the ventilator is operating from an external power source. When the ventilator is running from the internal battery, the External Power indicator is off. When running from external power, the indicator shows the following levels.

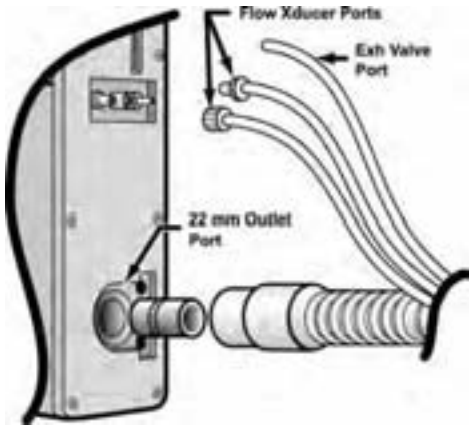
LED Color	Power Level
Green	External Power level is acceptable
Amber	External Power level is low

External power may be provided by connecting the ventilator to an external battery or to an external AC power source.

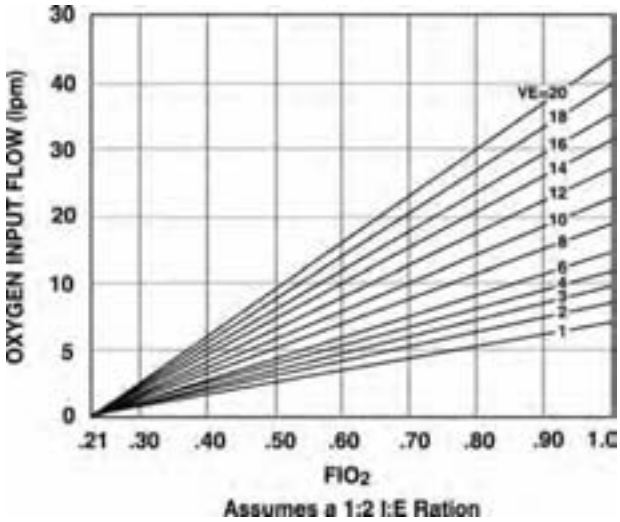
ATTACHING A BREATHING CIRCUIT

How to attach a Patient Breathing Circuit.

1) Connect the main breathing tube to the 22 mm outlet port on the right side of the ventilator.
2) Connect the two exhalation flow transducer sense lines to the ports marked **Flow Xducer** on the right side of the ventilator. These are non-interchangeable Luer fittings.
3) Connect the Exhalation Valve driver line to the port marked **Exh Valve** on the right side of the ventilator.



OXYGEN COMPUTER CHART



Oxygen Computer Chart

To determine O_2 Input Flow:

1) Find the desired F_{iO_2} on the horizontal axis.
2) Project up to the minute volume.
3) Project horizontally to the left vertical axis and read the oxygen flow.

To determine O_2 Concentration:

1) Find the O_2 input flow on the vertical axis.
2) Project horizontally right to the minute volume.
3) Project vertically down to the horizontal axis and read the F_{iO_2}.

ALARMS

How to Silence and Reset Alarms

To silence an alarm, press the **Silence Reset** button.
To reset an alarm that has been corrected, press the **Silence Reset** button again.

Alarm	Cause	Solution
APNEA XX bpm	Occurs when the time since the last breath start exceeds the set Apnea Interval. When an Apnea alarm occurs, the ventilator will enter Apnea Back up ventilation mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.
APNEA	An Apnea alarm has occurred and cleared The ventilator is no longer in Apnea Back-up mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.

Alarm	Cause	Solution
BAT EMPTY	Occurs when the ventilator is operating from the internal battery power and the batter charge level is critically low. This alarm can be temporarily silenced but cannot be cleared.	Attach the ventilator to external AC or DC power.
BAT LOW	Occurs when the ventilator is operating from internal battery power and the battery charge level is low.	Attach the ventilator to external AC or DC power. Reevaluate power requirements.
DEFAULTS	Occurs during POST when the ventilator detects an invalid setting stored in non-volatile memory.	Push the **Silence/Reset** button twice to reset alarm. Reevaluate ventilator settings.
DEFAULTS SET	Occurs when the ventilator is first powered up after the **SET DEFAULTS** option has been used to reset all controls and extended features settings to their factory-set default values.	Push the **Silence/Reset** button twice to reset alarm. Reevaluate ventilator settings.

Alarm	Cause	Solution
DISC/SENSE	Occurs when the ventilator detects one of the following conditions: • The patient circuit or proximal pressure sense line has become disconnected. • The low side exhalation flow transducer sense line has become disconnected. • The proximal pressure sense line is pinched or occluded.	Check Patient Circuit assembly for disconnects. Check pressure sensing lines for occlusions.
HIGH f	Occurs when the Total Breath Rate (**f**) exceeds the high breath rate and time period alarm values.	Check Patient Circuit assembly for leaks. Check **HIGH f** alarm values.
HIGH O_2 PRES (LTV® 1200 only)	Occurs when the average oxygen inlet pressure exceeds the acceptable limit for the type of oxygen source.	Reduce O_2 inlet pressure.

Alarm	Cause	Solution
HIGH PEEP	Occurs when the ventilator detects one of the following conditions: • The patient circuit positive end expiratory pressure (PEEP) exceeds the High PEEP alarm setting. • Patient Circuit, Exhalation valve and/or PEEP valve occluded.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
HIGH PRES	Occurs when the circuit pressure exceeds the set High Pressure Limit setting.	Reevaluate ventilator settings. Inspect Patient Circuit for occlusions or kinks. Reevaluate patient.
HW Fault	Occurs when the ventilator detects a problem with the ventilator hardware.	If alarm reoccurs, contact your Service Rep or Pulmonetic Systems.

Alarm	Cause	Solution
INOP 	A ventilator INOP occurs when: • The ventilator is switched from On to Standby. • The ventilator detects any condition that is deemed to make the ventilator unsafe.	If an **INOP** alarm occurs during operation, remove ventilator from service and contact your Service Rep.
LOCKED	The **LOCKED** message is displayed when a button is pressed while the controls are locked. No audible alarm is given.	Press the **Control Lock** button. If locked alert continues, press and hold the **Control Lock** button for three seconds.
LOW MIN VOL	Occurs when the exhaled minute volume is less than the set Low Minute Volume.	Examine Exhalation Valve body for disconnects. Reevaluate patient.

Alarm	Cause	Solution
LOW O_2 PRES (LTV® 1200 only)	Occurs when the average oxygen inlet pressure is less than the minimum acceptable inlet pressure of 35 PSIG.	Increase O_2 inlet pressure. If using O_2 cylinder, replace used cylinder with a new one.
LOW PEEP	Occurs when the patient circuit Positive End Expiratory Pressure (PEEP) is less than the Low PEEP alarm setting.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
LOW PRES	Occurs when the peak inspiratory pressure for a machine or assist breath is less than the Low Pressure setting.	Examine Patient Circuit for disconnect. Reevaluate ventilator settings. Reevaluate patient.
NO CAL DATA, NO CAL	Occurs when the ventilator detects invalid or missing calibration records on power up.	Remove ventilator from service, perform Calibration procedure.

Alarm	Cause	Solution
POWER LOST	Occurs when the ventilator is operating on external power and the voltage drops below the useable level and switches to internal battery operation.	Evaluate power requirements. Attach ventilator to an external AC or DC power source.
POWER LOW	Occurs when the ventilator is operating on external power and the voltage drops to the low level.	Evaluate power requirements.
REMOVE PTNT	Occurs when the ventilator is powered up in the Ventilator Checkout or Ventilator Maintenance modes. The ventilator is not delivering gas.	Ensure patient is disconnected from ventilator and is being ventilated by alternative means.

Alarm	Cause	Solution
RESET	A **RESET** alarm occurs if the ventilator restarts following a condition other than being shut down by pressing the On/Standby button.	May be caused by Internal Battery depletion or ESD. If the problem reoccurs, remove from service and contact your Service Rep or Pulmonetic Systems
SBT < f **SBT > f** **SBT < f/Vt** **SBT > f/Vt** **SBT OFF**	These alarms are only active in the Spontaneous Breathing Trial (SBT) mode of ventilation (see the *LTV® 1200 or LTV® 1150 Operator's Manual,* Chapter 9, for more information on each alarm setting).	
XDCR FAULT	Occurs when a transducer autozero test fails.	Press **Silence/Reset** button twice to reset alarm. If problem occurs frequently, remove from service and contact your Service Rep. or Pulmonetic Systems.

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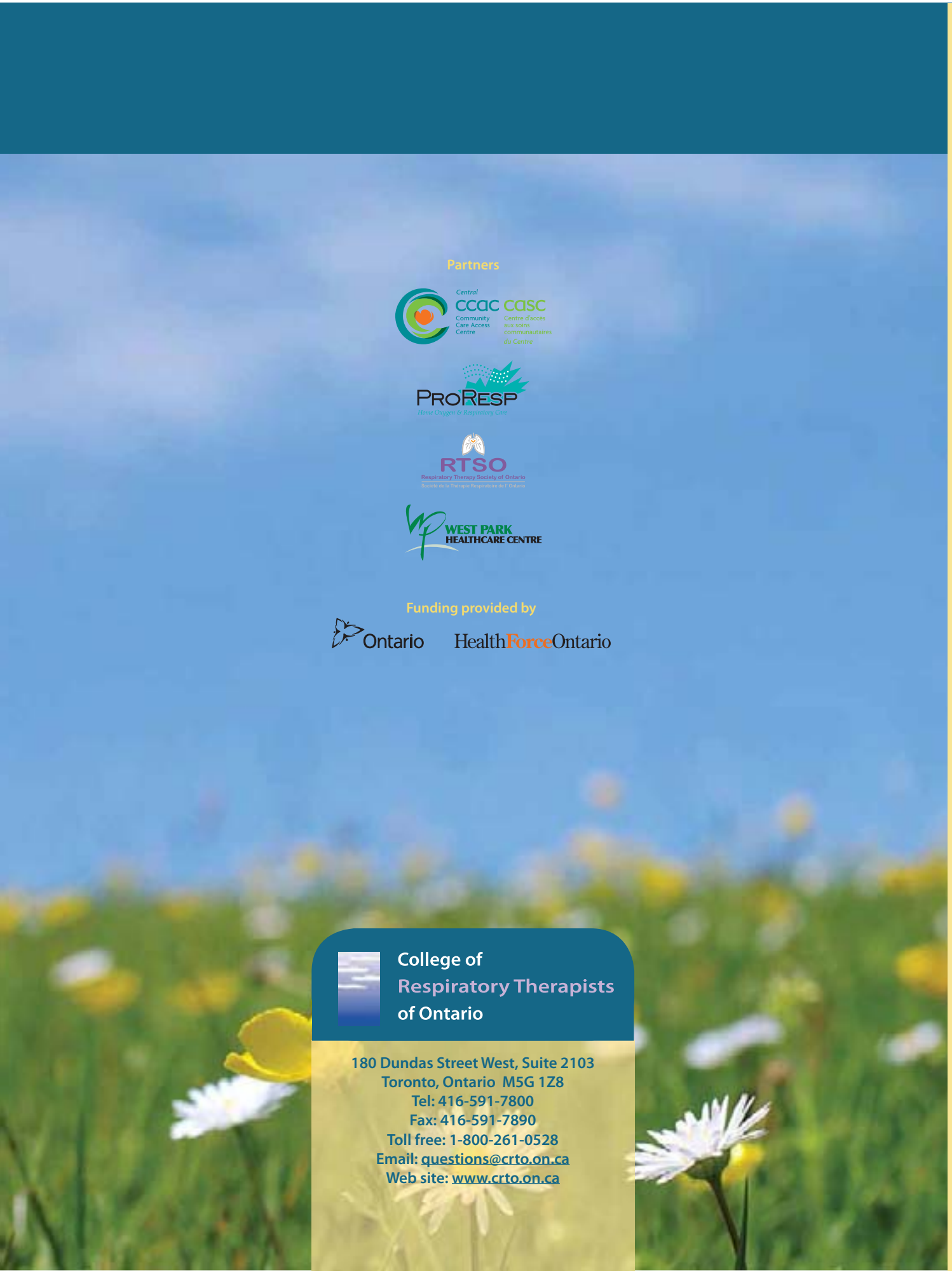
Notes

On the CD

- ✓ Glossary of Terms
- ✓ Identification and Preparation Tool
- ✓ Preparation for ICU Discharge
- ✓ Preparation for Hospital Discharge
- ✓ Home Ventilation & Tracheostomy Care (for Adults)
- ✓ Non-Invasive Positive Pressure Ventilation (for Adults)
- ✓ Home Ventilation and Tracheostomy Care (for Paediatrics)
- ✓ Pulmonary Clearance Techniques
- ✓ Routine Tasks
- ✓ My Education Checklist and Learning Log
- ✓ Oximeter Teaching Checklist
- ✓ Troubleshooting Guide
- ✓ Emergency Contacts and Planning
- ✓ Useful Web Resources
- ✓ Emergency Preparedness Guide for People with Disabilities/Special Needs
- ✓ Assistive Devices Program Equipment/ Supply Authorization Form
- ✓ Quick Reference Guide to LTV® 900, 950 & 1000 Series Ventilators
- ✓ Quick Reference Guide to LTV® 1200/1150 Series Ventilators

Resource CD



Partners

Central CCAC Community Care Access Centre

CASC Centre d'accès aux soins communautaires du Centre

ProResp Home Oxygen & Respiratory Care

RTSO Respiratory Therapy Society of Ontario

West Park Healthcare Centre

Funding provided by

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